



Contaminated Sediments News



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CS News is produced by the EPA Office of Science and Technology (OST) to exchange information on contaminated sediments and to increase communication among interested parties. To obtain copies of this report or to contribute information, contact Jane Marshall Farris, EPA OST, mail code 4305, 401 M Street S.W., Washington, DC 20460 at (202) 260-8897.

To be added to the mailing list or to make changes to your address, please fax your request to Jane Marshall Farris at (202) 260-9830.

EPA Releases National Inventory of Contaminated Sediments

The U.S. Environmental Protection Agency's (EPA's) first national report on sediment quality in the nation's rivers and other inland and coastal waterways finds every state has some sediment contamination—accumulation of toxic chemicals sufficient to pose potential risks to people who eat fish, and to fish and wildlife themselves.

Sites with the highest measured levels of sediment contamination tend to cluster around larger urban areas and industrial centers, and in regions affected by agricultural and urban runoff. Streams, lakes, and harbors can be affected.

Report Released in January

EPA released its report, *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States*, on January 7, 1998. It is the Agency's first comprehensive analysis of existing sediment chemistry and related biological data to assess the national incidence and severity of sediment contamination.

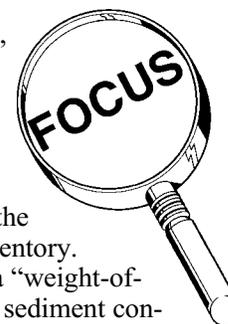
The three-volume report describes areas where chemical contaminants are present in river, lake, ocean, and estuary sediments and includes an assessment of the potential for associated adverse effects on people and aquatic life:

- *Volume 1: National Sediment Quality Survey* (EPA 823-R-97-006) assesses the probability of associated adverse human or ecological effects with contaminated sediment based on a weight-of-evidence evaluation.
- *Volume 2: Data Summaries for Water-*

sheds Containing Areas of Probable Concern (APCs) (EPA 823-R-97-007) presents sampling station location maps and chemical and biological summary data for watersheds containing APCs.

- *Volume 3: National Sediment Contaminant Point Source Inventory* (EPA 823-R-97-008): A screening analysis that identifies probable point source contributors of sediment pollutants.

In preparing the report, EPA assembled the largest set of sediment chemistry and related biological data ever and compiled the data into a database called the National Sediment Inventory. EPA advocates using a "weight-of-evidence" approach to sediment contamination assessment based on many types of measures.



The Agency examined approximately 2 million records from more than 21,000 sampling stations located in 1,363 of the 2,111 watersheds (65 percent) in the continental United States. The locations were sampled between 1980 and 1993. Because the data were collected over a relatively long period of time, the results represent conditions over the past 15 years and are a baseline for future assessments.

Watershed Classifications

EPA classified each sampling station in one of three tiers based on data recorded

Continued on page 2

for that location: 26 percent of the sampling stations fell into Tier 1 - adverse effects are probable; 49 percent fell into Tier 2 - adverse effects are possible but expected infrequently; and 25 percent fell into Tier 3 - no indication of adverse effects.

Adjusting for sampling bias towards known or suspected contamination, and the efficiency of screening-level assessment guidelines to predict adverse effects, EPA estimates that approximately 6 - 12 percent of the sediment underlying the nation's surface water poses a potential environmental threat.

Areas of Probable Concern

The Agency identified 96 watersheds (7 percent of those evaluated) that contain "areas of probable concern" (APCs) where potential adverse effects of sediment contamination are likely to be found.

These watersheds contain 10 or more Tier 1 sampling stations, and at least 75 percent of their sampling stations are classified as either Tier 1 or Tier 2. As shown in the accompanying map, they are on the Atlantic, Gulf, Great Lakes, and Pacific coasts, as well as in inland waterways, and in regions affected by urban and agricultural runoff, municipal and industrial waste discharges, and other pollution sources.

Bottom-dwelling creatures may not be able to live in portions of these watersheds. And because contaminants in sediment can move up the food chain, fish that live in these waters may contain chemicals at levels unsafe for regular consumption.

Some of these areas have been studied extensively, and appropriate management actions are now in place.

Other areas, however, may require further evaluation to confirm that environmental effects are occurring. Because EPA relied on readily available electronic data, primarily from national and regional data-

bases, some well-known highly contaminated areas are omitted.

Concerns Over Fish Consumption

Anyone fishing contaminated waters for food faces health risks. People who regularly eat fish caught

from areas where sediment is contaminated may increase their risk of cancer or other long-term adverse health effects because toxic chemicals can accumulate in the edible portions of fish.

Most states routinely issue consumption warnings for waters where fish are contaminated. More than two-thirds of the watersheds containing areas of probable concern already have active fish consumption advisories in place. Not all of the APCs are based on potential human health risk, however, many are based solely on potential risks to aquatic life.

Sediment at many sites throughout the United States was polluted years ago by chemicals such as DDT, polychlorinated biphenyls (PCBs), and mercury. While their use has been banned or restricted for many years, these chemicals persist for decades in the sediment, where they continue to be a source of concern for the environment and public health. In the meantime, other chemicals entering surface waters from industrial and municipal discharges and polluted runoff from urban and agricultural areas continue to accumulate to harmful levels in sediments.

Societal Costs of Contamination

Ecological and human health impairment due to contaminated sediment imposes costs on society. Diseases that cause tumors and fin rot in fish and the loss of

Heads Up on EPA's Contaminated Sediment Management Strategy

As this issue of CSNews was going to press, EPA's *Contaminated Sediment Management Strategy* was nearing its own publication date.

The document will be available soon as EPA 823-R-98-001 from NCEPI; P.O. Box 42419; Cincinnati, Ohio 45242. Additional information will be available in the next issue of CSNews.

species and communities that cannot tolerate sediment contamination can severely damage aquatic ecosystems.

Potential societal costs include lost recreational enjoyment and revenues or, worse, possible long-term health problems such as cancer or children's neurological and IQ impairment if fish consumption warnings are not issued and heeded.

The health and ecological risks posed by contaminated sediment dredged from harbors can lead to increased cost of disposal and lost opportunities for beneficial uses, such as habitat restoration.

Future Study Recommendations

Based on the results of this study, EPA recommends further evaluations of the 96 watersheds containing areas of probable concern that focus on:

- Collecting and analyzing additional sediment chemistry and related biological data where needed.
- Further evaluating the potential for human health and ecological risk.
- Determining spatial and temporal trends.
- Identifying potential sources of con-

taminants and determining whether they are adequately controlled.

For More Information

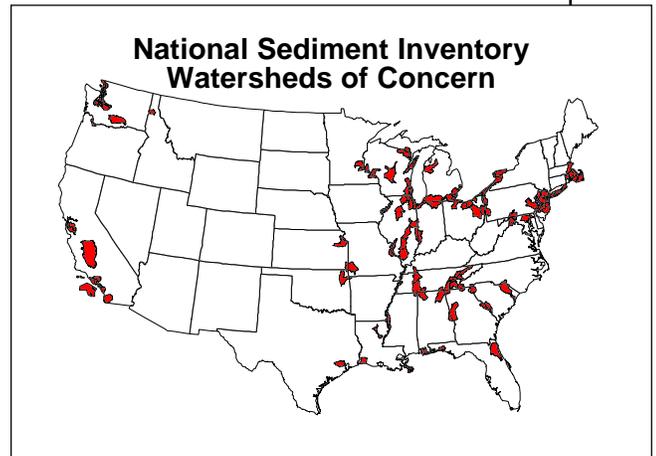
An electronic copy of *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States* is available on the Internet at <http://www.epa.gov/OST/>

Printed copies are available from:

U. S. Environmental Protection Agency
National Center for Environmental Publications and Information (NCEPI)
P.O. Box 42419
Cincinnati, Ohio 45242

They may be ordered by phone at (800) 490-9198; fax at (513) 489-8695 or on the Internet at <http://www.epa.gov/ncepihom/orderpub.html>.

To order copies from the National Technical Information Service, U.S. customers should call (800) 553-NTIS, and other customers should call (703) 605-6000.



Summary of Discussions During the Interactive Short Course on "Use of Sediment Quality Guidelines in the Assessment and Management of Contaminated Sediments"

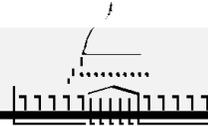
A 1-day course held in San Francisco, California, on November 16, 1997, in conjunction with the 18th annual SETAC meeting, described approaches to developing sediment quality guidelines (SQGs) and discussed their use in sediment quality assessment and management.

The course was developed by 24 instructors and attended by 80 individuals representing a broad range in backgrounds and expertise. It consisted of both Plenary and Work Group sessions. The opening plenary session gave participants information on the derivation, strengths, limitations, and uses of numerical SQGs. An integrated framework for assessing sedi-

ment quality conditions and several case studies were presented to illustrate the applications of SQGs.

The Work Group sessions gave course participants an opportunity to discuss several important applications of the SQGs, including dredged material disposal analysis, sediment management, and sediment remediation. During the final plenary session, the main points of the Work Group discussions were presented to the entire group. In addition, through keypad polling and panel discussions, participants expressed their views on the application of SQGs.

Continued on page 5



Clean Water Action Plan Targets Fish Advisories, Contaminated Sediments

The President's Clean Water Action Plan, released in February, provides a blueprint for restoring and protecting the nation's rivers, lakes, and coastal areas.

Its centerpiece is a new initiative to integrate efforts to restore and protect the quality of water and related natural resources on a watershed basis. Organizing projects at this level helps achieve clean water goals in more places, more quickly.

The plan is the core of the President's Clean Water Initiative to fulfill the Clean Water Act's original goal—fishable and swimmable water for every American. It seeks to bolster current clean water programs in public health and other areas.

Fish and the Action Plan

Improving assurances that fish and shellfish are safe to eat is one way the plan will increase efforts to protect public health.

States and tribes issue consumption advisories to protect citizens from eating contaminated fish. In 1996, 2,193 public advisories restricting the consumption of locally caught fish were in effect. Today, 15 percent of the nation's lake acreage and 5 percent of the nation's river miles are under fish consumption advisories, along with all of the Great Lakes and their connecting waters, a large portion of the nation's coastal waters, and about 20 percent of the National Wildlife Refuges.

Most consumption advisories have involved mercury contamination of fish. Mercury accumulates most efficiently in the aquatic food web. Predators at the top of the aquatic food web generally have higher mercury concentrations.

To assess the extent of fish contamination, the action plan calls for EPA and the National Oceanic and Atmospheric Administration to conduct a national survey of mercury and other contaminant levels in fish and shellfish from 1998 to 2000. To

maximize its coverage, this effort will be coordinated with state and tribal efforts.

Contaminated Sediment and the Action Plan

Besides mercury, fish advisories have been issued for such long-lasting toxic pollutants as polychlorinated biphenyls (PCBs), chlordane, dioxin, and DDT—even though the use of PCBs, chlordane, and DDT was banned or drastically restricted many years ago. Many of these pollutants settle into aquatic sediments, remaining a source of contamination long after the original source is controlled.

The plan lists three key EPA actions regarding contaminated sediments:

- Develop, by 1998, a multimedia strategy addressing mercury and other persistent, bioaccumulative, and toxic pollutants that cannot be fully addressed through single medium controls or approaches. The strategy will include enforcement and compliance efforts to address noncompliance associated with contaminated fish and shellfish areas.
- Release its Contaminated Sediment Strategy for coordinating program goals to (1) prevent increases in the volume of contaminated sediment, (2) reduce the volume of existing contaminated sediment, (3) ensure that sediment dredging and disposal are managed in an environmentally sound manner consistent with the needs of waterborne commerce, and (4) develop scientifically sound sediment management tools for use in pollution prevention, source control, remediation, and dredged material management.
- Begin, in 1998, place-based contaminated sediment recovery demonstration projects in five of the watersheds of greatest concern listed in EPA's

National Inventory of Sediment Quality. Remediation efforts will be coordinated with federal resource trustees.

Conclusions

Even with aggressive efforts to reduce the levels of mercury and other pollutants in fish and sediment that make fish unsafe to eat, many years will be required to stop and then reverse the buildup of these pollutants. Before pollution reduction mea-

sures lower pollutants in fish to safe levels, federal, state, and tribal agencies must work together to ensure that the public is accurately informed about contaminated sediments and related health risks of eating fish from specific waters.

For More Information

The Clean Water Action Plan is available for review on the Internet at <http://www.epa.gov/cleanwater/action/toc.html>.

SHORT COURSE SUMMARY *Continued from page 3*

Discussions Summary

Some important summary points from the course participants' discussions and associated keypad polling sessions included:

- Information on background concentrations is important for using SQGs in sediment quality assessments.
 - SQGs are useful tools for assessing sediment quality, but all SQGs derived from different approaches have a number of limitations which influence their use in various applications. Therefore, SQGs used in conjunction with other tools (e.g., toxicity tests, benthic community surveys) to obtain a weight-of-evidence can enhance sediment management decisions.
 - SQGs provide relevant tools for screening sediment chemistry data; designing monitoring programs; identifying the need for source controls; classifying hot spots, ranking sites; identifying chemicals of potential concern; and establishing candidate sediment quality remediation objectives. However, they cannot be used alone as pass/fail criteria for all applications.
 - Sediment chemistry, sediment toxicity, benthic invertebrate community structure, and bioavailability data are all relevant for development of sediment quality remediation objectives (i.e., clean-up levels).
 - Multiple SQGs can be evaluated and the most appropriate used to develop sediment quality remediation objectives for a particular site.
- Effects-based SQGs do not consider the potential for bioaccumulation; therefore, bioaccumulation-based SQGs should be evaluated and used, as applicable, to support the establishment of sediment quality remediation objectives.
 - A range of suggestions for improving the SQGs were also provided by short course participants, including addressing the major limitations of the SQGs, identifying cause and effect relationships, calculating toxicity equivalents, addressing the bioavailability of contaminants, identifying the substances contributing to the toxicity of mixtures, and increasing their applicability in different sediment types.

Guidance Planned

The instructors are developing a series of journal articles dealing with guidance on uses of SQGs to assess and manage contaminated sediments. They plan to develop a lead paper describing an overall framework of how SQGs can be used in assessing sediments, followed by a series of papers outlining SQG applications.

For More Information

A detailed summary of the discussions held during the short course is available on the Internet at: <http://www.ecrc.cr.usgs.gov/pubs/shortcourse.htm>.

Additional information is available by contacting Don MacDonald (MacDonald Environmental Sciences Ltd., 250 753-1583; e-mail; SFF-MESL@island.net) or Chris Ingersoll (USGS), (573) 876-1819; e-mail: chris_ingersoll@usgs.gov).

Inland Testing Manual Published by EPA and U.S. Army Corps of Engineers



The Inland Testing Manual (ITM) contains up-to-date procedures to implement requirements in the Clean Water Act (CWA) Section 404(b)(1) Guidelines for evaluation of potential contaminant-related impacts associated with the discharge of dredged material in fresh, estuarine, and saline (near-coastal) waters. Formally titled *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual*, it was prepared by a joint Environmental Protection Agency/U.S. Army Corps of Engineers (EPA/CE) Workgroup.

In 1991, EPA and CE revised an Ocean Testing Manual (*Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual*) for evaluation of potential contaminant-related impacts associated with the discharge of dredged material in the ocean, under the Marine Protection Research and Sanctuaries Act (MPRSA). The ITM is patterned after this manual.

The ITM Addresses:

- contaminated-related impacts associated with discharges of dredged material resulting from navigational dredging (or dredging activities of essentially the same character as navigation dredging, such as open water discharges of dredged material excavated from a soft-bottom flood control channel or reservoir) in open water disposal areas.
- contaminated-related impacts to waters of the U.S. associated with dredged material runoff from confined disposal areas.

The ITM Does Not Address:

- impacts associated with the dredging activity itself.
- impacts associated with dredged material discharges resulting from exca-

vation of drainage ditches and landclearing.

- impacts associated with the discharge of fill material. However, where dredged material associated with navigational dredging will be discharged in open water as fill, the procedures of this manual are applicable (e.g., the construction of an underwater berm using dredged material).

Purpose

The ITM provides a national testing framework which comprises one element of an overall decision-making process for determining whether dredged material can be discharged into CWA Section 404 waters. The ITM is intended to provide for consistency between dredged material evaluations under CWA and MPRSA. In recognition of the importance of site- and situation-specific concerns, regional flexibility in implementation and application is allowed within this national framework.

Description

The ITM uses a tiered testing approach:

- **Tier I** - Involves an examination of existing information to determine (1) whether or not there is "reason to believe" that the material needs to be tested for potential adverse effects, and (2) identification of any contaminants of concern relative to testing in later tiers. Material may be excluded from further testing if there is reasonable assurance that (1) it is not a carrier of contaminants, or (2) it is adjacent and similar to the disposal site material, and dispersal of the discharge can be controlled. Some limited testing may be necessary to confirm such exclusions.
- **Tier II** - Is concerned solely with sediment and water chemistry. Tier II provides useful information through screening tools, but not all possible determinations can be reached at this tier. It presently consists of (1) mea-

suring dissolved contaminants, (2) evaluation of state Water Quality Standard (WQS) compliance using a numerical mixing model, and (3) an evaluation of theoretical bioaccumulation potential for nonpolar organic chemicals.

- **Tier III** - Employs well-defined, nationally accepted bioassays including: (1) water column laboratory toxicity tests, (2) whole sediment laboratory toxicity tests, (3) whole sediment bioaccumulation tests. Appropriately sensitive organisms are recommended, including benchmark species for evaluating the sensitivity of regional species. Summaries of test conditions and test acceptability criteria for all recommended bioassay species are also provided. Toxicity testing emphasizes acute responses, generally survival. Water column toxicity evaluations consider mixing of the dredged material at the discharge site. Benthic bioaccumulation testing provides for the determination of bioavailability through 28-day exposure tests. Tier III testing will usually provide sufficient information for use

in the overall decision-making process for compliance with the Guidelines.

- **Tier IV** - Will only be used in special cases, where results from tests in earlier tiers are insufficient to determine the potential adverse effects of the material to be discharged. Tier IV, like Tier III, uses toxicity and bioaccumulation tests, however: (1) toxicity tests may involve field (rather than laboratory) exposures, different endpoints (e.g., chronic rather than acute), different species, or longer laboratory exposures; (2) bioaccumulation tests may involve field (rather than laboratory) exposures using transplanted or resident organisms, or longer laboratory exposures. Tier IV can also include benthos studies.

The ITM Includes

- Statutory and Regulatory Background
- Scope and Applicability
- Overview of Testing and Evaluation
- Technical Guidance
 - Sampling and Analysis
 - Physical and Chemical Evaluations
 - Bioassays (Toxicity and Bioaccumulation)
 - Quality Assurance/Quality Control
 - Evaluation of Discharges from Confined Disposal Facilities
 - Evaluation of Mixing
 - Statistical Methods
 - Identification of Ammonia Toxicity

National Sediment Bioaccumulation Conference Proceedings Published

The proceedings are available for the National Sediment Bioaccumulation Conference sponsored by EPA's Office of Science and Technology (OST) and Office of Research and Development in September 1996.

They document the conference presentations, panel discussions, and other key conference materials such as the final agenda and attendee list. The papers in the proceedings include state-of-the-science information on bioaccumulation assessment, case studies on using bioaccumulation data in risk assessments, and examples of integrating such data into EPA's regulatory decision-making.

The proceedings are currently available on the OST home page: www.epa.gov/OST.

Summary

The ITM is intended to provide greater national consistency in the (1) testing process, and (2) level of environmental protection, both among regions of the U.S. and between inland and ocean waters.

For More Information

The ITM is available for viewing or downloading at <http://www.epa.gov/OST/pubs/ITM.html> and <http://www.wes.army.mil/el/dots/>.

Additional information is available from Mike Kravitz of EPA at (202) 260-8085. His e-mail address is Kravitz.Michael@epamail.epa.gov.

To order copies from the National Technical Information Service, U.S. customers should call (800) 553-NTIS, and other customers should call (703) 605-6000.

Information Exchange Program Offers Links to Central and Eastern Europe

If you have questions about the environment in Central and Eastern Europe, the Regional Environmental Center (REC) for Central and Eastern Europe can help.

The REC is an independent, nonprofit, regional organization devoted to the improvement of the environment in Central and Eastern Europe. It was established in 1990 by the United States, Hungary, and the Commission of the European Communities. Additional donors include Austria, the Czech Republic, Denmark, Finland, France, Germany, Japan, the Netherlands, Norway and Switzerland. Today, there are 24 signatory governments to its charter.



Austria, the Czech Republic, Denmark, Finland, France, Germany, Japan, the Netherlands, Norway and Switzerland. Today, there are 24 signatory governments to its charter.

The Center's mission is to assist in solving the environmental problems in Central and Eastern Europe by encouraging cooperation among nongovernmental organizations (NGOs), governments, businesses, and other environmental stakeholders, by supporting the free exchange of information and by promoting public participation in

environmental decisionmaking. Beneficiary countries include Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, FYR Macedonia, Poland, Romania, Slovakia, Slovenia and FR Yugoslavia.

REC's Information Exchange Program has extensive resources including a specialized library, computer databases, and

access to global electronic communications networks. It fields questions from many public and private groups, including NGOs looking for information about funding, environmental events, and the activities of other organizations; governments seeking comparative information on policymaking tools; and journalists seeking referrals to independent experts.

The REC publishes *The Bulletin*, a quarterly English-language newsletter, as well as monthly local-language newsletters, an annual report, and many reports that result from its activities. Also available in print and electronic format are:

- NGO Directory, listing more than 1,700 organizations in 15 countries.
- Environment and Government Directory, with contact information for all the environmental ministries in Central and Eastern Europe.
- Grant Project Summaries, describing the results of REC-funded projects.
- Environmental Business Directory, listing more than 700 environmental suppliers in Poland, the Czech Republic, the Slovak Republic, and Hungary.

For More Information

The Regional Environmental Center for Central and Eastern Europe can be reached at:

Ady Endre út 9-11, 2000
Szentendre, Hungary
tel: (36-26) 311-199
fax: (36-26) 311-294
e-mail: rec-info@rec.org
CompuServe: 100324,24

The Center maintains home pages on the World Wide Web, Gopher, and FTP servers at the following address:

<http://www.rec.org>
<gopher://gopher.rec.org>
<ftp://ftp.rec.org>

New Data Study Supports Existing Sediment Quality Guidelines Developed Using Co-occurrence Approaches

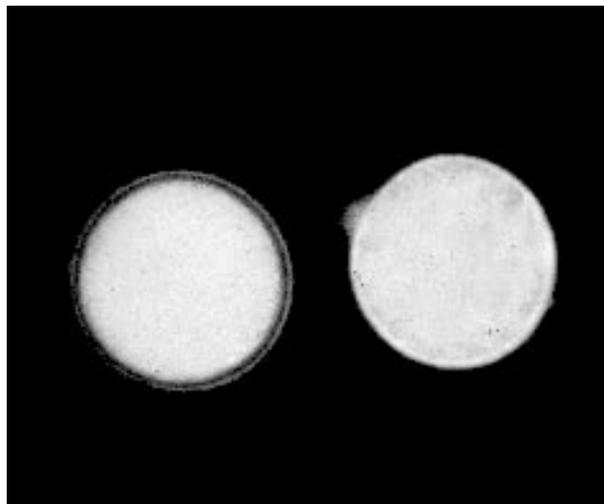
Co-occurrence approaches for developing sediment assessment guidelines rely on paired field and laboratory data to relate incidence of observed biological effects to the dry-weight sediment concentration of a specific chemical parameter.

Long et al. (1995) and MacDonald et al. (1996) have generated marine sediment quality guidelines using similar co-occurrence approaches. For each chemical parameter, both approaches identify an upper threshold above which adverse biological effects frequently occur, and a lower threshold below which adverse biological effects rarely occur. Despite some differences in methodology and data used, the thresholds derived from each approach are generally in good agreement with one another.

Comparison of independently derived sediment quality guidelines to existing co-occurrence values, using the same methodology, can help determine how applicable a particular co-occurrence approach is to other data sets and to other measures of effects. Numerous sediment quality assessment surveys using the sea urchin (*Arbacia punctulata*) fertilization and embryological development tests have been conducted along the Atlantic and Gulf coasts of the United States. The sea urchin test is performed using porewater from sampled sediment. These data were used to generate co-occurrence sediment quality guidelines using the Long et al. and MacDonald et al. methods for four metals and for PAHs.

In general, there was excellent agreement between the porewater-based values and the existing sediment quality guidelines. The lower threshold values tended to correspond more closely than the upper threshold comparisons, which were generally within a factor of 2 and usually lower than the comparable Long et al. and MacDonald et al. values. The close correspondence among comparable values for these two distinctly different data sets

demonstrates the general applicability of sediment quality guidelines based on the co-occurrence approach, and the comparability of the sea urchin porewater test to other adverse biological effect measures.



Unfertilized (left) and fertilized egg with an elevated fertilization membrane, the endpoint used in the fertilization assay.

For More Information

For more information, contact Robert Scott Carr, Ph.D., United States Geological Survey, Corpus Christi, TX at (512) 980-3216 (e-mail: Scott_Carr@usgs.gov).

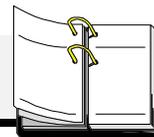
References Cited

Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediment. *Environ. Mngmt.* 19:81-97.

MacDonald, D.D., R.S. Carr, F.D. Calder, E.R. Long, and C.G. Ingersoll. 1996. Development and evaluation of sediment quality guidelines for Florida coastal waters. *Ecotoxicology* 5:253-278.

Editors Note: This article comes from the poster, *Comparison of Sediment Porewater Effect Based Concentration Values with Marine Sediment Quality Assessment Guidelines*, presented at the 1996 annual Southeast Chapter of the Society of Environmental Toxicology and Chemistry (SETAC) meeting in Washington, DC.

CSN Activities Timeline



July 6-10, 1998

Quantitative Methods in Ecotoxicology
College of William and Mary
Virginia Institute of Marine Science
Gloucester Point, Virginia

July 20-24, 1998

Quantitative Methods in Ecotoxicology
University of Georgia's Savannah River
Ecology Laboratory
Aiken, South Carolina

Course presenting quantitative methods for analyzing and applying ecotoxicological data with PC-based software. The scientific and statistical soundness of techniques are emphasized. Morning lectures will outline quantitative methods and statistical aspects of their implementation. Example data sets will be analyzed using PC-based software during the afternoon sessions.

For more information, contact:
Dr. Michael C. Newman (Instructor)
The College of William and Mary
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August 24-28-1998

Annual Multi-Regional Meeting on Water Quality Standards, Water Quality Criteria, and Implementation, including Water Quality-Based Permitting

"Strengthening the Foundation of the Nation's Water Quality Program"

Wyndham Franklin Plaza Hotel*
Philadelphia, Pennsylvania



EPA's meeting on water quality provides for an exchange of scientific, technical, and policy information on water standards, water quality

criteria, and implementation, including water quality-based permitting.

This meeting will focus on the Water Quality Criteria and Standards Plan, a vision and strategy for important new initiatives to improve water quality, better protect human health, and maintain and enhance the quality of the nation's water.

Request for Abstracts: Please submit abstracts by May 1, 1998. Potential topics for abstracts and poster sessions include:

- Developing nutrient criteria and assessment methods to better protect human health and aquatic life.
- Developing criteria for microbial pathogens to better protect human health.
- Using biological criteria as an improved basis for aquatic life protection.
- Maintaining and strengthening existing ambient water quality criteria.
- Ensuring implementation of these new initiatives and improvements by the States and Indian tribes in partnerships with EPA.

Registration and logistical information will be posted on the Office of Science and Technology Home Page at www.epa.gov/OST and the Office of Wastewater Management Home Page at www.epa.gov/OWM.

For additional information you may also contact EPA's contractor, The Cadmus Group, at (703) 998-6862 (press 2190) or by e-mail at mrm98@cadmusgroup.com.

***Note:** An earlier announcement identified the meeting site as the Philadelphia Marriott Convention Hotel. The meeting location has been changed to the Wyndham Franklin Plaza Hotel, 17th and Race Street, Philadelphia (phone: 215 448-2000).

August 31 - September 3, 1998

3rd International Conference on Hydrosience and Engineering
Cottbus/Berlin, Germany

The conference will cover the latest ideas in the field of hydrosience and engineering, including the scientific aspects of modelling (conceptual, physical-mathematical models, field observations, computer science application, and computer implementation).

Conference topics will include surface and subsurface hydrodynamics; estuarine, coastal, and nearshore processes; river mechanics; reservoir management; erosion and sedimentation modeling; pollutant transport and dispersion in free surface and ground water; data investigation and uncertainty analysis; numerical methods and techniques; parameter estimation and control applications; software development and model building; and management and decision support systems.

Sponsors include the International Association for Hydrological Sciences and the International Research and Training Center on Erosion and Sedimentation

For more information, contact:
Conference Secretariat
Brandenburg University of Technology at Cottbus
Institut fuer Bauinformatik
Karl-Marx-Strasse 17
D-03044
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Fax: +1-49-355-69-2262
e-mail: lfb@bauinf.tu-cottbus.de
Web: <http://www.bauinf.tu-cottbus.de/ICHE98/>

September 15-17, 1998

Fourth International Symposium and Exhibition on Environmental Contamination in Central and Eastern Europe
Warsaw, Poland

Using a global perspective, experts will discuss and demonstrate equipment, innovative technologies, and management methods that can be used to address environmental problems.

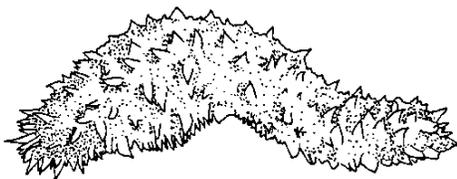


Technical focus areas will include site restoration and remediation, waste treatment and disposal, technology development, environmental monitoring, site characterization, containment and control, human health and risk assessment, and other issues related to environmental contamination.

For more information, contact:
Warsaw '98
Florida State University
2035 East Paul Dirac Drive, 226 HMB
Tallahassee, Florida 32310-3700
Phone: (850) 644-7211
Fax: (850) 574-6704
e-mail: Warsaw98@mailier.fsu.edu
Internet: <http://www.warsaw98.fsu.edu>

Creature Feature

If you bother me before I have a chance to burrow into the sediment, you may end up with a handful of my innards. Do you know what I am?



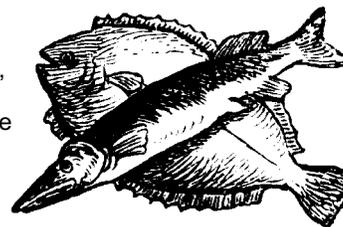
The Creature Feature is a sea cucumber, *Parastichopus californicus* (Stimpson).

October 5-7, 1998

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