Note: This document contains only Chapter 46 of the Oklahoma Water Resources Board's rules. Also, this document was prepared by Oklahoma Water Resources Board staff as a convenience to the reader, and is not a copy of the official Title 785 of the Oklahoma Administrative Code. State law requires that the Secretary of State's office provide permission to copy the official code. The rules in the official Oklahoma Administrative Code control if there are any discrepancies between the Code and this document.

CHAPTER 46. IMPLEMENTATION OF OKLAHOMA'S WATER QUALITY STANDARDS

July 12, 1999

[Authority: 82 O.S., Sections 1085.30 and 1085.2]
[Source: Codified 7-1-96]

SUBCHAPTER 1. GENERAL PROVISIONS

785:46-1-1. Purpose, scope and applicability

(a) According to 82 O.S., §1085.30, the Oklahoma Water Resources Board *is authorized to promulgate rules to be known as "Oklahoma Water Quality Standards" which establish classifications of uses of waters of the state, criteria to maintain and protect such classifications, and other standards or policies pertaining to the quality of such waters* [82:1085.30(A)]. The "Oklahoma Water Quality Standards" are codified at OAC 785:45. Section 1085.30 of Title 82 O.S. also provides for the Oklahoma Water Resources Board to adopt and promulgate "*implementation documents*" [82:1085.30(D)], which are rules to implement the Oklahoma Water Quality Standards. Such implementation rules are set forth in OAC 785:46 *and shall be enforced by all state agencies within the scope of their jurisdiction* [82:1085.30(D)]. Implementation rules in OAC 785:46 shall be applicable to all activities which may affect the quality of waters of the state. The implementation rules in OAC 785:46 are the only binding and enforceable statements for implementing the "Oklahoma Water Quality Standards". For example, OAC 785:46 controls and takes precedence over water quality standards implementation found in other documents, including but not limited to the "Continuing Planning Process" document published by the Oklahoma Department of Environmental Quality.

(b) If a permittee can demonstrate to the satisfaction of the permitting authority that scientific methods, data, or implementation procedures different than those specified in this Chapter will achieve a more appropriate or representative implementation of the Standards, then the permitting authority shall use or apply such methods, data, or procedures to implement the Standards. In those circumstances where the permitting authority does not agree that the permittee's proposed scientific methods, data, or implementation will result in a more appropriate or representative implementation of the Standards, the permittee may request a review of the proposed scientific methods, data, or implementation by the agency responsible for Standards implementation who shall determine its appropriateness.

(c) Implementation rules provide a bridge between water quality standards in OAC 785:45 and water quality management. For example, water quality standards contain numerical criteria to protect aquatic life. Permits incorporating these criteria must be issued to limit effluent

concentrations so that the criteria are not violated outside the mixing zone. In this case the implementation rules describe how the criteria are translated into permit limits.

(d) Subchapters in OAC 785:46 are arranged in the sequence in which they were drafted by the Oklahoma Water Resources Board staff and adopted by the Oklahoma Water Resources Board. Following the initial promulgation of OAC 785:46, additional subchapters and implementation rules may be promulgated as the need arises.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-1-2. Definitions

In addition to definitions of terms found in OAC 785:45-1-2, which are incorporated herein by reference, the following words, terms and notations, when used in this Chapter, shall have the following meanings unless the context clearly indicates otherwise:

"σ_y" means the standard deviation of flow distribution.

"7Q2" means the design flow for determining allowable discharge load to a stream. The flow is calculated as a moving average of seven consecutive days for each year in a given record. These seven-day low flow values are ranked in ascending order. An order number (m) is calculated based upon the number of years of record (n), with a recurrence interval (R) of two years, as m = (n+1)/R, where R = two years. A value of flow corresponding to the m^{th} order is taken as the seven-day, two-year low flow for those historical data.

"7T2" means the seven-day maximum temperature likely to occur with a 50% probability each year. The 7T2 is calculated using a moving average of seven consecutive days for each year in a given record. These seven day receiving stream temperature values are ranked in descending order. An order number, m, is calculated based on the number of years of record, n, with a recurrence interval of 2 years, as m = (n+1)/2. The m^{th} highest average temperature is the 7T2.

"A" means mean annual average flow.

"ACR" means acute to chronic ratio.

"Acute to chronic ratio" means LC50/NOEC. The NOEC is the highest concentration at which no effect on test organisms is observed over a relatively long period. Quarterly biomonitoring over the life of the permit is sufficient to determine the ACR if the NOEC and LC50 may be determined. If the ACR is unknown, a default value of 10 may be used for implementation purposes.

"Background concentration" means the concentration not attributable to the effluent at the point of maximum concentration on the mixing zone boundary.

"Beneficial use limitation" means a more stringent restriction than that required to protect the beneficial use. A prohibition on new point sources is an example of a beneficial use limitation.

"BOD" means biochemical oxygen demand.

"C" means maximum concentration on the mixing zone boundary.

"C_{95}" means the 95th percentile maximum likelihood concentration.

"C_b" means background concentration.

"C_e" means effluent concentration.

"cfs" means cubic feet per second.

"C_{mean}" means the geometric mean of all effluent concentrations analyzed for the toxicant.

"C_t" means the appropriate criterion listed in OAC 785:45.

"CBOD" means carbonaceous biochemical oxygen demand.

"Coefficient of variation" means standard deviation divided by the mean.

"Continuing Planning Process (CPP)" means the most recent edition of the document produced annually by the Oklahoma Department of Environmental Quality which describes water quality programs implemented within the State.

"Continuing toxicity" means a tendency to be toxic.

"Control" means test organisms exposed to 0% effluent as part of the whole effluent toxicity testing procedure.

"Cooling water reservoir" means a privately owned reservoir used in the process of cooling water for industrial purposes.

"CPP" means the Continuing Planning Process document.

"CV" means coefficient of variation.

"D" means diameter of the discharge pipe in feet.

"df" means dilution factor.

"Dilution capacity" means a measure of the ability of the receiving stream to dilute effluent,

defined as the ratio of the regulatory effluent flow to the regulatory receiving stream flow.

"Dilution factor" means a measure of the minimum dilution that occurs on the mixing zone boundary.

"Discharge to a lake" means a discharge within the lake's normal pool elevation as listed in the Oklahoma Water Atlas, Oklahoma Water Resources Board Publication 135, May 1990, excluding discharges to lock and dam reservoirs.

"Discharge to a stream" means (1) any discharge outside the normal pool elevation of a lake as such elevation is listed in the Oklahoma Water Atlas, Oklahoma Water Resources Board Publication 135, May 1990, and (2) any discharge to a lock and dam reservoir, such as Webbers Falls Reservoir and Robert S. Kerr Reservoir.

"Drainage area" means the area above the discharge drained by the receiving stream.

"EPA" means the United States Environmental Protection Agency.

"HQW" means high quality waters as defined in OAC 785:45-3-2(b).

"Increased load" means the mass of pollutant discharged which is greater than the permitted mass loadings and concentrations, as appropriate, in the discharge permit effective when the SWS, HQW, or ORW beneficial use limitation was assigned.

"Lake mixing zone" means a volume extending one hundred feet from the source for implementation purposes, unless otherwise specified in OAC 785:45.

"LC50" means the lethal concentration as defined in OAC 785:45-1-2.

"LFD" means low flow dilution.

"LMFO" means licensed managed feeding operation as defined in 2 O.S. 9-202.

"Low flow dilution" means the dilution that the effluent experiences at maximum concentration on the mixing zone boundary at low flow (7Q2 or 1 cfs).

"LTA" means long term average.

"LTA_A" means acute long term average.

"LTA_C" means chronic long term average.

"LTA_H" means human health long term average.

"MAL" means monthly average level.

"Maximum daily level" means the concentration of a toxicant in the permit which may never be exceeded by the observed effluent concentration.

"MDL" means maximum daily level.

"Mean annual average flow" means the annual mean flow found in "Statistical Summaries", USGS publication no. 87-4205, or most recent version thereof, or other annual mean flow as approved by the Oklahoma Water Resources Board or the permitting authority.

"Monthly average level" means the concentration of a toxicant in the permit which may not be exceeded by the observed effluent concentration averaged over a calendar month.

"NLW" means nutrient-limited watershed as defined in OAC 785:45-1-2.

"NLW Impairment Study" means a study using criteria prescribed in OAC 785:45 to determine whether a beneficial use or uses in a waterbody identified in Appendix A of OAC 785:45 is impaired.

"NOEC" means no observed effect concentration.

"NPDES" means National Pollutant Discharge Elimination System.

"Normal pool elevation" means the elevations listed in the "Oklahoma Water Atlas", Oklahoma Water Resources Board publication no. 135, or most recent version thereof.

"ORW" means Outstanding Resource Waters as defined in OAC 785:45-3-2(a).

"Outfall" means a point source which contains all the effluent being discharged to the receiving water.

"OWQS" means Oklahoma Water Quality Standards.

"Persistent toxicity" means toxicity due to effluent constituents which are not subject to decay, degradation, transformation, volatilization, hydrolysis, or photolysis.

"Q*" means dilution capacity.

"Q_e" means the regulatory effluent flow.

"Q_{el}" means long term average effluent flow.

"Q_{es}" means short term average effluent flow.

"Q_u" means the regulatory receiving stream flow.

"Regulatory mixing zone" means the volume of receiving water described in 785:45-5-26.

"Reasonable potential factor" means the 95th percentile maximum likelihood estimator for a lognormal distribution.

"Significant non-lethal effect" is defined as a statistically significant difference (95%

confidence level) between reproduction or growth of a specific test organism in a dilution specified by the LFD and the control. Statistical analyses used shall be consistent with methods described in EPA's publication no. 600/4-89/001, "Short-Term Methods For Estimating The Chronic Toxicity of Effluents and Receiving Waters To Freshwater Organisms", or most recent revision thereof.

"SS" means sample standard as defined in OAC 785:45-1-2.

"SWS" means Sensitive Public and Private Water Supplies.

"T" means maximum temperature difference at the edge of the mixing zone boundary.

"T_a" means regulatory ambient temperature.

"T_c" means the temperature criterion.

"T_f" means the 95th percentile maximum observed effluent temperature.

"TDS" means total dissolved solids at 180°C.

"TMDL" means total maximum daily load.

"Total maximum daily load" means the sum of individual wasteload allocations for point sources, safety reserves, and loads from nonpoint source and natural backgrounds.

"Toxicity reduction evaluation (TRE)" means an investigation intended to determine those actions necessary to develop water quality-based effluent limits by reducing an effluent's toxicity to an acceptable level. It is a step-wise process which combines toxicity testing and analysis of the physical and chemical characteristics of a toxic effluent to identify the constituents causing effluent toxicity and/or treatment methods which will reduce the effluent toxicity.

"Trophic State Index" means a numerical quantification of lake productivity. The Trophic State Index shall be determined by TSI = 9.81 x Ln(chlorophyll-a) + 30.6.

"TSI" means Trophic State Index.

"TSS" means total suspended solids.

"USGS" means United States Geological Survey.

"W" means canal width in feet.

"Wasteload allocation" means the effluent concentration or load of a substance or parameter which is designed to attain a criterion.

"WET" means whole effluent toxicity.

"WLA" means wasteload allocation.

"WLA_a" means acute wasteload allocation.

"WLA_c" means chronic wasteload allocation.

"WLA_l" means long term average wasteload allocation.

"WLA_s" means short term average wasteload allocation.

"Whole effluent toxicity test" means subjecting test organisms to an effluent, or dilutions thereof. The endpoint for test failure is lethality.

"YMS" means yearly mean standard as defined in OAC 785:45-1-2.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 15 Ok Reg 2874-2875, eff 7-1-98; Amended at 16 Ok Reg 3251-3252, eff 7-12-99]

785:46-1-3. Procedural and substantive authority

The rules in OAC 785:46 provide for implementation of the "Oklahoma Water Quality Standards". The rules in this Chapter are promulgated as rules by the Oklahoma Water Resources Board pursuant to the procedures specified in the Oklahoma Administrative Procedures Act, 75 O.S. Section 250 et. seq., and pursuant to the substantive law provided in 82 O.S. Section 1085.30.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-1-4. Testing procedures

All methods of sample collection, preservation, and analysis used in implementing OAC 785:45 shall be in accordance with "The Guidelines Establishing Test Procedures for the Analysis of Pollutants" as provided by 40 C.F.R. Part 136, or other procedures approved by the Oklahoma Laboratory Certification Program of the Oklahoma Department of Environmental Quality.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-1-5. Errors and separability

(a) Any errors in OAC 785:46 resulting from inadequate and erroneous data or human or clerical oversight will be subject to correction by the Oklahoma Water Resources Board. Discovery of any such errors does not render the remaining and unaffected implementation rules in OAC 785:46 invalid.

(b) If any implementation rule in OAC 785:46 is held to be invalid, the application of such rule to other circumstances and the remainder of OAC 785:46 shall not be affected thereby.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

SUBCHAPTER 3. IMPLEMENTATION OF NARRATIVE TOXICS CRITERIA TO PROTECT AQUATIC LIFE USING WHOLE EFFLUENT TOXICITY (WET) TESTING

Section

785:46-3-1. Applicability and scope

(a) The rules in this Subchapter provide a framework for implementing narrative criteria in OAC 785:45 which prohibit toxicity to aquatic life in waters of the state. This framework is based upon a testing method known as whole effluent toxicity (WET) testing. WET testing is to be used to address point source activities which have the potential for persistent effluent toxicity. A permitting agency may issue a whole effluent toxicity (WET) permit limit when more than one datum indicates a reasonable potential to exceed the water quality standards. However, a toxicity reduction evaluation (TRE) is not required unless continuing toxicity has been verified through WET testing.

(b) If effluent toxicity is not persistent, increased toxicity testing to determine the source of toxicity is required.

(c) If it is determined that toxicity is related to a particular chemical constituent, a numerical permit limit may be imposed for that toxicant.

(d) Toxicity from halogens (e.g. chlorine, bromine and bromo-chloro compounds) will be controlled by dehalogenation rather than WET testing. However, use of dehalogenation shall not exempt an effluent from the WET testing requirements of this Subchapter.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-3-2. Whole effluent toxicity testing

(a) **General.** Generally, two whole effluent toxicity tests shall be used to implement the narrative criteria to protect fish and wildlife propagation. The 48 hour acute test will be used to protect against acute toxicity in receiving water, and the 7 or 21 day chronic test will be used to protect against chronic toxicity outside the chronic regulatory mixing zone.

(b) **Examples of tests.** More specific tests and test organisms for determining whole effluent toxicity include:

(1) Chronic static renewal 7-day survival and reproduction test using *Ceriodaphnia dubia* (Method 1002.0) as described in Third Edition, EPA publication no. 600-4-91-002 (July 1994), "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", or most recent revision thereof.

(2) Chronic static renewal 7-day larval survival and growth test using fathead minnow (*Pimephales promelas*) (Method 1000.0) as described in Third Edition, EPA publication no. 600-4-91-002 (July 1994), "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", or most recent revision thereof.

(3) Acute 48-hour static renewal toxicity test using *Daphnia pulex* or *Ceriodaphnia dubia* as described in "Methods for Measuring the Acute Toxicity of Effluent to Freshwater and Marine Organisms", Fourth Edition, EPA publication no. 600/4-90/027F (August 1993), or most recent revision thereof.

(4) Acute 48-hour static renewal toxicity test using *Pimephales promelas* as described in "Methods for Measuring the Acute Toxicity of Effluent to Freshwater and Marine Organisms", Fourth Edition, EPA publication no. 600/4-90/027F (August 1993), or most recent revision thereof.

(5) Chronic 21 day test for *Daphnia magna* as described in American Society for Testing and Materials, "Standard Guidance for Conditions for the Renewal Life Cycle Toxicity Test with *Daphnia magna*", publication no. E1193, or most recent revision thereof.

(6) Other tests or test organisms specified by the permitting agency.

(c) **Differing requirements based upon dilution capacity.**

(1) Two different toxicity testing requirements exist for streams. The smaller long term average effluent concentration for the permitted substance with the smallest acute to chronic ratio determines which testing requirement is used. If an acute to chronic ratio cannot be determined from available data, an acute to chronic ratio of 10 shall be used. A third toxicity testing requirement exists for lakes.

(2) Acute testing only shall be required for large streams. The acute test will be more stringent than the chronic test and can be used alone to ensure that the narrative prohibitions for both acute and chronic toxicity are met.

(3) Chronic testing only shall be required for small and medium size streams. The chronic test will be more stringent than the acute test and can be used alone to ensure that the narrative prohibitions for both acute and chronic toxicity are met.

(4) An acute test with 100% effluent shall be used to prevent acute toxicity in lakes.

(d) **Forty-eight hour acute test.**

(1) Acute screening tests are used for routine monitoring in lakes. Acute screening test investigations will utilize either *C. dubia* or *D. pulex* and *P. promelas*, and contain no less than 2 replicates of 10 organisms each (20 organisms) and one control sample containing no less than 2 replicates of 10 organisms each (20 organisms). Test duration shall be 48 hours. Test validity shall be based upon greater than or equal to 90% survival in the control. If acute test failure is observed in 100% effluent, the permittee shall, within 24 hours of becoming aware, notify the permitting agency and conduct a total of two acute screening retests within the next 60 days. If lethality is confirmed by acute test failure in a retest, the permittee shall initiate a toxicity reduction evaluation (TRE). If acute test failure is not observed, the permittee shall continue testing, using the acute screening test.

(2) Acute definitive tests shall be used to prevent toxicity in large streams. All procedures specified in 785:46-3-2(d)(2) for acute screening tests shall be employed for acute definitive tests. In addition, each acute definitive test shall contain no less than two replicates of a 0.75 dilution series and control based on the acute low flow dilution set forth in Appendix A of this Chapter containing no less than 10 individuals per dilution replicate to calculate an LC50 value. Test validity shall be based upon greater than or equal to 90% mean survival in the controls. The permittee shall, within 24 hours of becoming aware of test failure, notify the permitting authority and conduct a total of two definitive retests within the next 60 days. If lethality is confirmed by acute test failure in a retest, the permittee shall initiate a toxicity reduction evaluation (TRE). If acute test failure is not observed, the permittee shall continue testing, using the acute definitive test.

(e) **Seven or twenty-one day chronic test.**

(1) In small and medium size streams, chronic testing only will prevent acute toxicity. In such streams, chronic testing will also prevent chronic toxicity outside the chronic regulatory mixing zone.

(2) Usually the 7 day test will be used to determine chronic test failure, and dilution and control water will be used in accordance with OAC 785:46-3-3(c). However, the 21 day test for *Daphnia magna* may be used to determine chronic test failure if the permitting agency determines that receiving stream toxicity is due solely to total dissolved solids in the *Ceriodaphnia dubia* test. In this case, *Daphnia magna* will allow use of the receiving stream for dilution and control water in the chronic toxicity test. *Daphnia magna* may not be used when the effluent TDS is greater than that of the

receiving water. Chronic testing shall incorporate the 0.75 chronic Low Flow Dilution (LFD) series set forth ir Appendix A of this Chapter with no less than 5 replicates of no less than 8 vertebrate organisms at each dilution and associated controls. For invertebrate organisms, the testing procedures specified in OAC 785:46-3-2(b)(1) shall be followed. Test validity shall be based upon greater than or equal to 80% mean survival in the controls. If chronic test failure is observed, the permittee shall, within 24 hours of becoming aware, notify the permitting agency. The permittee shall conduct a total of two chronic retests within 60 days following the failed test. If chronic test failure is not observed, the permittee shall continue chronic testing.

(3) Chronic retests are used to verify continuing chronic toxicity following initial chronic test failure. All procedures specified in 785:46-3-2(e)(2) for chronic testing shall be employed for the chronic retest. If chronic test failure is confirmed by either retest the permittee will initiate a TRE. If a toxicity retest at the low flow dilution demonstrates a significant non-lethal effect the permit may be reopened to require effluent limits, additional testing and/or a TRE to address non-lethal toxic effects. If toxicity retests indicate lethality at dilution # 5 but do not indicate lethality at the LFD the permit may be reopened to require effluent limits, additional testing, and/or a TRE to address chronic toxicity outside the mixing zone. If the effluent does not demonstrate chronic toxicity at the low flow dilution, or lethality at dilution # 5 in either chronic retest, the permittee shall continue testing for the life of the permit.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 16 Ok Reg 3254-3256, eff 7-12-99]

785:46-3-3. Sampling for whole effluent toxicity testing

(a) A discrete 48 hour test will be required on each outfall. No combining of outfalls will be allowed for the 48 hour test, since acute toxicity is prohibited within the mixing zone. For chronic testing only, discharges with overlapping mixing zones may be combined, at the discretion of the permitting agency, and whole effluent chronic toxicity tests may be required on the combined effluent. Samples shall be combined in proportion to the flow for each outfall. If some of the discharges are not toxic, combining discharges may allow intermittent instream toxicity if the discharge rates fluctuate. In these cases combined discharge testing will be disallowed. If the outfall originates from a lagoon with a retention time greater than 24 hours, composite samples may not be necessary. The permitting agency may determine that a grab sample near the discharge is sufficient.

(b) The toxicity test must be initiated within 36 hours after sample collection. No sample may be held for more than 72 hours prior to use.

(c) Laboratory dilution water or a grab sample shall be obtained for dilution and control water (0% effluent) to be used in the toxicity tests. The grab sample shall be uncontaminated receiving water collected upstream of and as close to the discharge point as possible. If the receiving water is unsatisfactory for dilution and control due to ambient toxicity, the permittee must substitute an appropriate dilution water, as described in "Methods for Measuring the Acute Toxicity of Effluent to Freshwater and Marine Organisms", EPA Publication no. 600/4-85/013, or "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", EPA Publication no. 600/4-89/001. The pH, hardness, conductivity and alkalinity must be similar to that of the receiving water. The permittee must report the toxicity of the upstream receiving water to the permitting agency.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-3-4. Toxicity reduction evaluation

(a) A toxicity reduction evaluation (TRE) is required as a result of acute or chronic retest failure (lethality). However, the permitting authority may consider the use of a toxicity identification evaluation (TIE) as a means to correct the cause of observed toxicity before the implementation of a TRE. If the results of any failed toxicity retest are due to factors outside the control of the permittee, the permitting authority may allow the

permittee to resample prior to requiring a TRE. If resampling does not result in test failure, no TRE is required. The TRE is an investigation intended to determine those actions necessary to achieve compliance with water quality based effluent limits by reducing an effluent's toxicity.
(b) The permittee shall submit a TRE Action Plan to the permitting agency.
[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

SUBCHAPTER 5. IMPLEMENTATION OF NUMERICAL CRITERIA TO PROTECT FISH AND WILDLIFE FROM TOXICITY DUE TO CONSERVATIVE SUBSTANCES

Section

785:46-5-1. Applicability and scope

Rules in this Subchapter are designed to implement numerical criteria identified in OAC 785:45-5-12(e)(6)(G) for protection of the beneficial use of Fish and Wildlife Propagation.
[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-5-2. Regulatory flow determination

(a) **Critical receiving stream flow.** Section 785:45-5-12(e)(6)(G) of the OAC defines the critical receiving stream flow upstream of the discharge, Q_u, to be used in implementing fish and wildlife propagation criteria. The critical flow is the greater of the 7Q2 or 1 cfs. The 7Q2's for some receiving streams are published in the United States Geological Survey publication entitled "Statistical Summaries Of Streamflow Records in Oklahoma and Parts of Arkansas, Kansas, Missouri and Texas Through 1984". Q_u is assumed to be 1 cfs if the 7Q2 is unknown or the permittee chooses not to develop an actual 7Q2.

(b) **Critical flow for lakes.** The horizontal jet plume model used to determine wasteload allocations for lakes does not require a critical flow. Therefore, receiving water flow need not be determined for discharges to lakes. A discharge to a lake is defined as a discharge within the lake's normal pool elevation as listed in the Oklahoma Water Atlas, Oklahoma Water Resources Board Publication 135, May 1990. Discharges to lock and dam reservoirs, such as Webbers Falls Reservoir and Robert S. Kerr Reservoir, are considered discharges to streams.
(c) **Critical effluent flows.** The critical effluent flow, Q_e, is the highest monthly averaged flow over the past two years for industrial discharges with adequate data. For other dischargers (e.g. municipalities), Q_e is the design flow. If a significant daily or seasonal variability in effluent flow is present, a critical effluent flow should take this variability into account.
[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 15 Ok Reg 2876, eff 7-1-98]

785:46-5-3. Permitting strategy to implement numerical aquatic criteria

(a) **General.** When drafting NPDES permits, the permitting authority shall review the effluent data submitted by the permittee to determine which pollutants are present and regulated under the Oklahoma Water Quality Standards. The need for a permit limit will be determined, on a pollutant by pollutant basis, after utilization of reasonable potential, which considers assimilation capacity of the receiving water and effluent variability.
(b) **Use of reasonable potential factor; relationship with wasteload allocation process.**

(1) The technical report produced by the Oklahoma Water Resources Board entitled "The Incorporation Of Ambient Concentration With That Due To Effluent For Wasteload Allocation" shall be used to determine if there is a reasonable potential for a criterion exceedance outside the mixing zone, and therefore a need for a permit limit. $C_{95} = 2.13C_{mean}$ is used for effluent concentration in the reasonable potential calculation. C_{mean} is the geometric mean of all effluent concentrations analyzed for the toxicant. If the geometric mean cannot be determined, an arithmetic mean may be substituted. If a large dataset of effluent concentrations is available, the permitting authority may not need to

estimate C_{95}; the 95th percentile value can be calculated from the data.

(2) The wasteload allocation process is used to determine reasonable potential. C, the maximum concentration on the chronic regulatory mixing zone boundary, is calculated for chronic criteria in streams as:

$$C = C_b + (1.94Q^*(C_{95} - C_b) / (1 + Q^*)$$

when Q^* is less than or equal to 0.1823, or

$$C = C_b + (C_{95} - C_b) / (6.17 - 15.51Q^*)$$

when Q^* is greater than 0.1823 and less than 0.3333, or

$$C = C_{95}$$

when Q^* is greater than or equal to 0.3333. $Q^* = Q_e/Q_u$. Q^* is the dilution capacity. C is calculated for lakes as:

$$pipe:\ C = C_b + (D(C_{95} - C_b)) / 20.15$$

when D is greater than or equal to 3 feet, or

$$canal:\ C = C_b + (W^{1/2}(C_{95} - C_b)) / 4.2$$

when W is greater than or equal to 3 feet. D is the diameter of the discharge pipe in feet and W is the width of the canal in feet. D and W shall not be less than three feet for implementation purposes. When C is the concentration on the acute regulatory mixing zone boundary it is calculated as

$$C = C_b + (Q_e (C_{95} - C_b) / 100).$$

(3) For small and medium size streams, C is computed on the chronic regulatory mixing zone boundary and compared to chronic criteria. For large streams, C is computed on the acute regulatory mixing zone boundary and compared to acute criteria. For lakes, C is computed on lake mixing zone boundaries and compared to chronic criteria. When either acute or chronic criteria are not listed in OAC 785:45, the listed value shall be used.

(4) Depending on the results of the reasonable potential computations, one of the following four actions will be required.

(A) **Cases where C including C_b is less than numerical criterion.** When the maximum concentration on the mixing zone boundary computed using the reasonable potential factor is less than the numerical criterion, no further action is required for the life of the permit. No additional monitoring is required and no wasteload allocation need be performed.

(B) **Cases where C including C_b is greater than numerical criterion.** When the reasonable potential computation shows that the concentration on the mixing zone boundary exceeds the numerical criterion a wasteload allocation and a water quality based limit will be developed for the permittee and a schedule of compliance (not to exceed three years) will be incorporated into the permit. A water quality based limit may be modified upon confirmed reduction of background concentrations due to application of best management practices or other factors.

(C) **Cases where C is greater than numerical criterion when C_b unknown.** When a reasonable potential computation shows that the effluent alone (substitute 0 for C_b in the equations set forth in OAC Section 785:46-5-3(b)(2)) may cause the maximum concentration on the mixing zone boundary to exceed the numerical criterion, a wasteload allocation will be performed by the permitting authority. Receiving stream monitoring and reporting of the limited pollutant will be required to establish background pollutant contributions in order to reevaluate the limits. An NPDES permit limit, with compliance schedule, will be established by the permitting authority.

(D) **Cases where C is less than numerical criterion when C_b unknown.** In those cases where the background concentration is unknown and the maximum concentration on the mixing zone boundary due to the effluent is less than the criterion, the long term average effluent concentration shall be compared to the most stringent long term average associated with the applicable criteria (calculated as provided in OAC 785:46-5-

5, 785:46-5-6 and 785:46-7-4(d)). If the effluent LTA is less than the most stringent criteria LTA, then background concentration monitoring shall not be required; otherwise, background monitoring shall be required.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 15 Ok Reg 2877, eff 7-1-98; Amended at 16 OK Reg 3256-3257, eff 7-12-99]

785:46-5-4. Wasteload allocations

(a) **General.** Wasteload allocations are developed to insure that Oklahoma's numerical criteria are not exceeded outside the mixing zones. Numerical criteria implementation requires a criterion, C_t, listed in the table in OAC 785:45-5-12(e)(6)(G). Wasteload allocations must be calculated for both acute and chronic criteria, if available, if OAC 785:46-5-3(b)(4) indicates there is a reasonable potential for a criterion exceedance. Because mixing zones for lakes are different from those for streams, wasteload allocations are determined in a different manner for lakes than for streams.

(b) **Chronic wasteload allocation for streams.** The following formulas from the technical report produced by the Oklahoma Water Resources Board entitled "The Incorporation Of Ambient Concentration With That Due To Effluent For Wasteload Allocation" shall be utilized:

$$WLA_c = C_b + ((1 + Q^*) (C_t - C_b)) / (1.94Q^*)$$

when Q^* is less than or equal to 0.1823, or

$$WLA_c = C_b + (6.17 - 15.51Q^*) (C_t - C_b)$$

when Q^* is greater than 0.1823 and less than 0.3333, or

$$WLA_c = C_t$$

when Q^* is greater than or equal to 0.3333. If $C_b > C_t$, an investigation of sources of upstream toxicity should be conducted. For implementation purposes, $C_b = C_t$ in this case, which results in a wasteload allocation equal to the criterion.

(c) **Acute wasteload allocation for streams.** The following formula shall be utilized to determine acute wasteload allocations in streams:

$$WLA_a = C_b + (6.17 - 15.51Q^*) (C_t - C_b).$$

If $C_b > C_t$, set $C_t = C_b$.

(d) **Wasteload allocation for lakes.** The regulatory mixing zone in lakes is defined to extend 100 feet from the source for implementation purposes. The following formula shall be utilized:

$$pipe: WLA = C_b + (20.15(C_t - C_b)) / D$$

when D is greater than or equal to 3 feet, or

$$canal: WLA = C_b + (4.2(C_t - C_b)) / (W^{1/2})$$

when W is greater than or equal to 3 feet. If $C_b > C_t$, then the lake is considered toxic and an investigation of toxicity sources should be conducted. For implementation purposes, $C_b = C_t$ in this case, which results in a wasteload allocation equal to the criterion.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 16 Ok Reg 3257, eff 7-12-99]

785:46-5-5. Long term average to protect against chronic toxicity

The chronic long term average (LTA_c) must be obtained from WLA_c, the chronic wasteload allocation, in order to determine which criterion implementation will be used for permit development. The long term average concentration for chronic toxicity is determined using the 99% probability basis. In accordance with EPA guidance,

$$LTA_c = WLA_c \exp(0.5\sigma^2_4 - 2.326\sigma_4),$$

$$where\ \sigma^2_4 = \ln[(CV^2 / 4) + 1].$$

CV is the coefficient of variation for the effluent concentration distribution. If effluent data is not sufficient to compute the coefficient of variation, CV = 0.6 shall be used. In this case,

$$LTA_c = 0.5274\ WLA_c.$$

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 16 Ok Reg 3257-3258, eff. 7-12-99]

785:46-5-6. Long term average to protect against acute toxicity

The acute long term average, LTA_a, must be

obtained from the acute wasteload allocation, WLA_a, to compare to other long term averages. Using the 99% probability basis in accordance with EPA guidance,

$$LTA_a = WLA_a \exp(0.5\sigma^2 - 2.326\sigma)$$

If effluent data is not sufficient to compute the coefficient of variation, CV = 0.6 shall be used. In this case,

$$LTA_a = 0.3211\ WLA_a.$$

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-5-7. Obtaining permit limits from long term averages

Daily maximum and monthly average permit limits are required by EPA regulation. The maximum daily level (MDL) and the monthly average level (MAL) will be obtained from the long term average (LTA) using the method described in the CPP. The LTA is the smallest of the long term averages for the acute criterion, the chronic criterion, the human health criterion and other long term averages. Load, as well as concentration, must be expressed in the NPDES permit.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-5-8. pH and hardness dependent toxicity

The criteria for some of the substances listed in 785:45-5-12(e)(6) are hardness or pH dependent. The segment averaged pH in Appendix B of this Chapter shall be used to determine the criterion if there is insufficient site specific data to determine receiving stream pH. The mean hardness of the receiving stream, collected near the outfall but not affected by the discharge (as $CaCO_3$) may be used by the permitting authority if at least 12 monthly samples were collected over a twelve month period. The segment averaged hardness in Appendix B of this Chapter shall be used in the determination of the criterion if there is insufficient site specific data to determine receiving stream hardness. If the required pH or hardness is not specified for a particular waterbody segment, the permitting authority may use appropriate data from surrounding waterbody segments.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-5-9. Consideration of background concentration

(a) Background concentration, C_b, is caused by sources upstream of the permitted discharge. These sources may be either point or nonpoint.

$$\text{where} \quad \sigma^2 = \ln(CV^2 + 1).$$

Nonpoint sources may be either natural or anthropogenic. Background concentration must be accounted for in the wasteload allocation because the assimilation capacity of the receiving stream decreases as the background concentration increases. The permitting agency shall determine which constituents must be monitored near a particular point source.

(b) Data to determine background concentration may be available from STORET or other data bases with adequate and documentable quality assurance procedures which are acceptable to the permitting authority. If sufficient data is not available, the receiving water shall be monitored to determine the background concentration. Samples will be collected at a location that is representative of the receiving water and unaffected by the discharge being permitted. In lakes, samples shall be collected at a point outside the regulatory mixing zone, which extends 100 feet in any direction from the source. Samples shall be collected as close to low flow conditions as possible in streams. The geometric mean of at least twelve concentration observations is required to determine the background concentration. Hardness/pH must be obtained along with C_b if the criterion is hardness/pH dependent.

(c) Until twelve appropriate concentrations are available, C_b shall be assumed zero. Background concentration shall also be assumed zero for small streams with no ambient monitoring required, unless upstream sources of toxicity are known. Therefore, if Q_u = 1 cfs, then C_b = 0.0, absent of known upstream sources. C_b shall also be assumed zero for discharges of "once through cooling water". However, these dischargers will be required to monitor both influent and effluent, as specified by the permitting authority.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

SUBCHAPTER 7. IMPLEMENTATION OF

NUMERICAL CRITERIA TO PROTECT HUMAN HEALTH FROM TOXICITY DUE TO CONSERVATIVE SUBSTANCES

Section

785:46-7-1. Applicability and scope

(a) **General.** Rules in this Subchapter implement numerical criteria to protect human health for consumption of fish flesh and/or water.

(b) **Applicable public and private water supply criteria.** Applicable criteria for waters designated Public and Private Water Supplies are found in OAC 785:45-5-10(1) and OAC 785:45-5-10(6) .

(c) **Applicable fish and wildlife propagation criteria.** Applicable criteria for waters designated Warm Water Aquatic Community and/or Cool Water Aquatic Community and/or Trout Fisheries are found in 785:45-5-12(e)(8).

(d) **Appropriate criterion.** If several criteria apply to human health implementation, the most stringent is used for implementation purposes.

(e) **Applicable receiving waters.** The human health criteria apply in receiving waters designated as Public and Private Water Supplies and certain designated sub-categories of Fish and Wildlife Propagation. Some streams in Appendix A of OAC 785:45 are designated Habitat Limited Aquatic Communities, and are not designated for the Public and Private Water Supply beneficial use. Therefore, human health criteria do not apply to these streams. For implementation purposes these streams are considered conduits to the downstream water body. Human health criteria must be implemented on the first downstream water body to which they apply.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-7-2. Determination and use of regulatory flow, Q_u

(a) **General.** OAC 785:45-5-10(1), 785:45-5-10(6)(B) and 785:45-5-12(e)(8)(B) require that long term average receiving stream flows shall be used to implement water column numerical criteria to protect human health.

(b) **Long term average flow on gaged receiving streams.** Mean annual average flow as determined in the technical report produced by the Oklahoma Water Resources Board entitled "Estimation Of Mean Annual Average Flows" shall be used for long term average flow in receiving streams which are or have been measured by USGS gages.

(c) **Mean annual average flows on ungaged receiving streams.** Mean annual average flow may be estimated on streams where flow is not routinely measured. This method for estimation is demonstrated in the technical report produced by the Oklahoma Water Resources Board entitled "Estimation Of Mean Annual Average Flows". Other scientifically defensible methods of long term average flow estimation are permissible if approved by the permitting authority.

(d) **Long term average flow in lakes.** Q_u cannot be estimated in a lake as easily as it can be for a stream. Therefore, mean annual average discharge from the lake shall be used for Q_u.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 15 Ok Reg 2877, eff 7-1-98]

785:46-7-3. Permitting strategy to implement numerical human health criteria

(a) **General.** OAC 785:45-5-10(1), 785:45-5-10(6)(B) and 785:45-5-12(e)(8)(B) require that complete mixing of effluent and receiving water shall be used to determine appropriate permit limits. A mass balance model shall be used for implementation purposes.

(b) **Use of reasonable potential factor; relationship with wasteload allocation process.**

(1) When drafting NPDES permits, the permitting authority will review effluent data and identify those pollutants found in the effluent which are regulated under the OWQS. The permitting authority will determine the need for a permit limit through utilization of the reasonable potential test.

(2) The mass balance equation will be used in the determination of human health reasonable potential:

$$C = (C_e Q^* + C_b) / (Q^* + 1).$$

$Q^* = Q_e/Q_u$, where Q_e is the regulatory effluent flow. C must be considered a long term

average concentration after complete mixing. C_b is the background concentration. To determine if there is a reasonable potential to exceed the criterion after complete mixing, choose $C_e = 2.13C_{mean}$, where C_{mean} is a geometric mean of all effluent concentrations analyzed for the toxicant. If the geometric mean cannot be determined, an arithmetic mean may be used instead.

(3) Representative background concentrations will be used if available. Such representative data should reflect long term average pollutant concentrations for implementation purposes. Otherwise, C_b is assumed zero.

(4) C must be compared with the applicable water quality criterion to determine if there is a reasonable potential for the pollutant discharge to cause a criterion exceedance. If concentration after complete mixing is greater than the human health criterion, a permit limit will be required.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 15 Ok Reg 2877. eff 7-1-98]

785:46-7-4. Performance of wasteload allocation; implementation into permitting

(a) **General.** When a reasonable potential computation shows that the effluent may cause the concentration after complete mixing to exceed the numerical criterion, a wasteload allocation will be performed. In those cases where the background concentration is unknown, the long term average effluent concentration shall be compared to the most stringent long term average associated with the applicable criteria (calculated as provided in OAC 785:46-5-5, 785:46-5-6 and 785:46-7-4(d)). If the effluent LTA is less than the most stringent criteria LTA, then background concentration monitoring shall not be required; otherwise, background monitoring shall be required.

(b) **Wasteload allocation to protect human health in streams.**

(1) For implementation purposes, the receiving water is considered a stream in all cases except when it is within a lake's normal pool elevation as listed in the Oklahoma Water Atlas, Oklahoma Water Resources Board Publication 135, May 1990. The human health mass balance wasteload allocation is written:

$$WLA = C + ((C - C_b) / Q^*)$$

where C becomes the appropriate human health criterion. For implementation purposes, Q_e is the mean annual average flow over the preceding two years for industrial discharges with adequate data. For other dischargers (e.g. municipalities), Q_e is the design flow.

(2) For wasteload allocation purposes, it is assumed that $C_b < C$.

(3) Representative background concentrations will be used if available, but assumed zero otherwise. Representative data is assumed to be an estimator of long term average pollutant concentrations for implementation purposes.

(4) No discharge to a stream in excess of any human health criterion shall be allowed for 5 miles upstream of a public water supply intake. A complete mix of the effluent and the receiving water is required to insure that criteria are not exceeded at the point of intake.

(c) **Wasteload allocations to protect human health in lakes.** A mass balance must be assumed for discharges within the normal pool elevation of lakes. The equation in 785:46-7-4(b) is applicable in such cases. Inflow concentration may not be representative of background concentration in a lake. Ambient monitoring, stipulated by a permit requirement to characterize background concentrations, will be collected within the normal pool elevation of the lake at a point unaffected by the discharge. No discharge within the normal pool elevation of a lake, in excess of any human health criterion, shall be allowed within one mile of a public water supply intake.

(d) **Wasteload allocation and long term average.** Since the wasteload allocation for human health is a long term average,

$$LTA_H = WLA,$$

where LTA_H is the human health long term average.

(e) **Obtaining permit limits from long term averages.** An NPDES permit limit will be established by the permitting authority, with compliance schedule if necessary. Permit limits

will be obtained from the long term average (LTA) using methods outlined in the CPP. The LTA is the smallest of the long term averages for the acute criterion, the chronic criterion, the human health criterion and other long term averages.
[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 15 Ok Reg 2878, eff 7-1-98]

SUBCHAPTER 9. IMPLEMENTATION OF CRITERIA TO PROTECT THE AGRICULTURE BENEFICIAL USE

785:46-9-1. Applicability and scope

Rules in this Subchapter are designed to implement criteria identified in OAC 785:45-5-13(h) and OAC 785:45 Appendix F for protection of the beneficial use of Agriculture. Included are criteria for chlorides, sulfates and total dissolved solids.
[**Source:** Added at 15 Ok Reg 2878, eff 7-1-98]

785:46-9-2. Applicable mineral criteria

(a) **General.** OAC 785:45 Appendix F contains yearly mean standards and sample standards for protection of the Agriculture beneficial use. Historical values for chlorides, sulfates and TDS for water quality segments identified in OAC 785:45 Appendix F will not be updated. Data from surrounding segments shall be used by the permitting authority to develop yearly mean standards and sample standards for those segments with inadequate historical data.
(b) **Segment averages.** Segment averages of yearly mean standards and sample standards shall be the criteria for chlorides, sulfates and TDS to protect the Agriculture beneficial use.
[**Source:** Added at 15 Ok Reg 2878-2879, eff 7-1-98]

785:46-9-3. Regulatory flows

(a) **General.** Six regulatory flows are required for implementation of yearly mean standards and sample standards. They include stream flows, regulatory flows for lakes and regulatory effluent flows.
(b) **Long term average flows for streams.** Mean annual average flow, A, will be used by the permitting authority for long term average flows to implement yearly mean standards. Mean annual average flows may be obtained from the USGS publication entitled "Statistical Summaries of Streamflow Records in Oklahoma and Parts of Arkansas, Kansas, Missouri and Texas through 1984" on streams with USGS gages. They may also be estimated on streams without gages using the Oklahoma Water Resources Board publication entitled "Estimation of Mean Annual Average Flows" (OWRB Technical Report 96-2).
(c) **Long term average flow for lakes.** Mean annual average discharge from the lake, A, shall be used to implement the Agriculture beneficial use.
(d) **Regulatory long term effluent flows.** If the permitting authority determines that sufficient data is available to calculate the mean annual effluent discharge, then such discharge shall be the long term effluent flow, Q_{el}. If the permitting authority determines insufficient data is available to calculate the mean annual effluent discharge, then the design flow shall be the long term effluent flow, Q_{el}.
(e) **Short term average flow for streams.** OAC 785:45-5-4(d) requires that short term average flow, Q_s, be used to implement sample standards. The short term average flow is determined so that short term and long term wasteload allocations are equally likely to be more stringent, depending on the historical concentration distribution for a particular segment.

$$Q_s = 0.68A.$$

A is mean annual average stream flow.
(f) **Short term average flows for lakes.** Short term average flows for lakes are also determined by the formula in OAC 785:46-9-3(e). In this case A is the mean annual average lake discharge.
(g) **Short term average effluent flows.** If the permitting authority determines that sufficient data is available to calculate the highest monthly average discharge for industrial discharges, then such discharge shall be the short term average effluent flow, Q_{es}. If the permitting authority determines insufficient data is available to calculate the highest monthly average discharge for industrial discharges, then the design flow shall be the short term average effluent flow, Q_{es}.
[**Source:** Added at 15 Ok Reg 2879, eff 7-1-98]

785:46-9-4. Background concentration

Background concentration must be obtained for wasteload allocation purposes. OAC 785:45 Appendix F. May be used to determine background concentration. The definitions of both yearly mean standard, YMS, and sample standard,

SS, must be used to obtain

$$BC = 2YMS - SS.$$

The BC is background concentration for both yearly mean standards and sample standards implementation. If the permitting authority determines that abundant data directly upstream from the source is available, the discharger may elect to compute background concentration using this data.
[**Source:** Added at 15 Ok Reg 2879, eff 7-1-98]

785:46-9-5. Permitting strategy to implement mineral criteria
(a) **General.** The need for a permit limit will be determined on a mineral constituent basis, after application of the reasonable potential equation specified in (b) of this Section, which considers assimilation capacity of the receiving water and effluent variability.
(b) **Reasonable potential equation.** OAC 785:45-5-13(d) requires that complete mixing of effluent and receiving water be taken into account in the reasonable potential equation. The use of mass balance to obtain wasteload allocations for complete mixing is codified at OAC 785:46-7-3(a). Therefore, the reasonable potential equation for mineral constituents is

$$C = (Q_u\ BC + Q_e C_{95}) \ / \ (Q_u + Q_e),$$

where C_{95} = 2.13 C_{mean}, where C_{mean} is the geometric mean of all effluent concentrations analyzed for the mineral. If the geometric mean cannot be determined, an arithmetic mean may be used. If sufficient effluent concentration observations exist as determined by the permitting authority, then the permitting authority may compute the 95th percentile concentration and use it as C_{95}, in accordance with OAC 785:46-5-3(b)(1).
(c) **Reasonable potential to exceed yearly mean standard.** Q_u = A and Q_e = Q_{el} in OAC 785:46-9-5(b) to obtain a long term average concentration after complete mixing. If C is greater than YMS there is a reasonable potential to exceed an Agriculture beneficial use criterion, so a permit limit is required.
(d) **Reasonable potential to exceed sample standard.** Q_u =0.68A and Q_e = Q_{es} in OAC 785:46-9-5(b) to obtain a short term average concentration after complete mixing. If C is greater than SS there is a reasonable potential to exceed an Agriculture beneficial use criterion, so a permit limit is required.
[**Source:** Added at 15 Ok Reg 2879, eff 7-1-98]

785:46-9-6. Wasteload allocations
(a) **General.** Permit limits to implement the Agriculture beneficial use are obtained through wasteload allocations. Wasteload allocations are calculated for both sample standards and yearly mean standards to insure that mineral criteria are not exceeded after complete mixing.
(b) **Wasteload allocation for YMS.** Since the yearly mean standard is a long term average, Q_{el} and A are used in the mass balance equation to obtain a long term wasteload allocation, WLA_l.

$$WLA_l = (YMS(A + Q_{el}) - A(BC))/Q_{el}.$$

(c) **Wasteload allocation for SS.** Since the sample standard is a short term average, Q_{es} and 0.68A are used in the mass balance equation to obtain a short term wasteload allocation, WLA_s.

$$WLA_s = (SS(0.68A + Q_{es}) - 0.68A(BC))/Q_{es}.$$

[**Source:** Added at 15 Ok Reg 2880, eff 7-1-98]

785:46-9-7. Long term average
(a) **General.** WLA_s must be converted to a long term average for comparison with WLA_l.
(b) **Long term average for WLA_s.** The long term average for WLA_s, LTA_s, may be determined using EPA's method with a 99% probability basis. If available effluent data is not sufficient to compute the coefficient of variation it shall be set equal to 0.6. In this case,

$$LTA_s = 0.527 WLA_s.$$

(c) **Long term average for permit development.** The smaller of LTA_s and WLA_l shall be used for permit development, provided that it is not less than a minimum criterion found in 785:45-5-13(h). The minimum criteria are 700 mg/L for TDS and

250 mg/L for chlorides and sulfates. They represent the lowest concentrations that may be used for long term average.
[**Source:** Added at 15 Ok Reg 2880, eff 7-1-98]

785:46-9-8. Obtaining permit limits from long term averages
(a) **General.** EPA regulation requires that maximum daily limits and average monthly limits be obtained from a long term average.
(b) **Loads.** Loads, as well as concentrations, must be expressed in the permit in order to implement mineral criteria.
[**Source:** Added at 15 Ok Reg 2880, eff 7-1-98]

SUBCHAPTER 11. IMPLEMENTATION OF TEMPERATURE CRITERIA TO PROTECT FISH AND WILDLIFE PROPAGATION

Section

785:46-11-1. Applicability and scope
(a) OAC 785:45-5-12(e)(2) provides that at no time shall heat be added in excess of the amount that will raise receiving water temperature more that 2.8 °C outside the mixing zone.. Therefore, the wasteload allocation for temperature will be implemented at the maximum temperature on the edge of the mixing zone.
(b) OAC 785:45-5-26 provides generally to the effect that in streams the mixing zone encompasses 25% of the total flow. The mixing zone in lakes may be designated by the permitting authority on a case by case basis. To be consistent, the mixing zone used for numerical criteria implementation to protect fish and wildlife propagation from toxicity will be employed for temperature implementation in lakes. This mixing zone is defined to extend 100 feet into the lake from the source.
(c) Temperature implementation does not apply to privately owned cooling water reservoirs. Such reservoirs are specifically exempted in OAC 785:45-5-12(e)(2)(F) from implementation of temperature criteria to protect aquatic life. However, implementation of the antidegradation policy includes a maximum temperature (52°C) which applies to all waters of the state including privately owned cooling water reservoirs. Privately owned cooling water reservoirs, however, that demonstrate no reasonable potential to exceed the antidegradation temperature shall not be limited in permits by such temperature.
(d) All calculations to implement temperature criteria shall be done in °C at critical temperature conditions.
[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 15 Ok Reg 2880, eff 7-1-98]

785:46-11-2. Applicable temperatures
(a) **General.** OAC 785:45-5-12(e)(2) governs what the applicable temperature criteria are.
(b) **Habitat limited and warm water aquatic community.**
(1) In waters which are designated in OAC 785:45 to be Habitat Limited Aquatic Community and/or Warm Water Aquatic Community, no heat of artificial origin shall be added that causes the receiving water to exceed the critical temperature plus 2.8°C outside the mixing zone.
(2) The temperature criterion for Habitat Limited Aquatic Community and/or Warm Water Aquatic Community, T_c, is the critical temperature plus 2.8°C. In the absence of data, T_c is 32.24°C. Where data exist, the critical temperature is the higher of 29.44°C or the seven-day maximum temperature likely to occur with a 50% probability each year, 7T2. The 7T2 is calculated using a moving average of seven consecutive days for each year in a given record. These seven day receiving stream temperature values are ranked in descending order. An order number, m, is calculated based on the number of years of 785:45-5-~~4~~(b) provides, with specific exceptions, that numeric criteria assigned for the protection of fish and wildlife propagation in OAC record, n, with a recurrence interval of 2 years, as m = (n+1)/2. The m^{th} highest average temperature is the 7T2. Provided, in the segment of the Arkansas River from Red Rock Creek to the headwaters of Keystone Reservoir, the maximum temperature outside the mixing zone shall not exceed 34.4°C.
(3) To implement the temperature criterion for

Habitat Limited Aquatic Community and/or Warm Water Aquatic Community protection, the critical temperature also is the regulatory ambient temperature, T_a.

(c) **Cool water aquatic communities.** In waters designated in OAC 785:45 to be Cool Water Aquatic Community, T_c is 28.9°C. To be consistent with implementation for warm water and habitat limited aquatic communities, the regulatory ambient temperature must be 2.8°C less than T_c. Therefore, T_a = 26.1°C for cool water aquatic communities.

(d) **Trout fisheries.** In waters designated in OAC 785:45 to be Trout Fishery, no artificial heat shall be added such that the temperature in the receiving water exceeds 20°C outside the mixing zone. However, water temperatures regularly reach in excess of 20°C in Oklahoma's summers. When background levels exceed this criterion, the effluent level should equal the criterion. Therefore, the wasteload allocation for trout fisheries is 20°C.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-11-3. Regulatory flows

(a) Regulatory receiving stream flow to protect the Fish and Wildlife Propagation beneficial use, Q_u, is the greater of the 7Q2 or 1 cfs. Q_u is assumed to be 1 cfs if the 7Q2 is unknown.

(b) The regulatory effluent flow, Q_e, is defined as the highest monthly averaged flow over the past two years for industrial discharges with adequate data. Q_e is the design flow for other dischargers.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 15 Ok Reg 2880, eff 7-1-98]

785:46-11-4. Permitting strategy to protect temperature criteria

(a) The permitting authority shall use a reasonable potential assessment to determine if the heated effluent will raise the temperature of the receiving water more than 2.8°C outside the mixing zone.

(b) If the maximum temperature difference at the edge of the mixing zone boundary, T', is greater than 2.8°C, then the permitting authority shall compute the wasteload allocation.

(c) For temperature implementation, the wasteload allocation shall be considered a weekly long term average temperature using a 50% probability basis.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-11-5. Reasonable potential

A permit limit for temperature is required if there is a reasonable potential that the temperature increase at the edge of the mixing zone is greater than 2.8°C. EPA Region 6 uses a reasonable potential factor to determine if there is a reasonable potential that concentration of a given substance will exceed the criterion. An analogous reasonable potential factor, T_f, will be used to determine if there is a reasonable potential that temperature will exceed the criterion by 2.8°C at the edge of the mixing zone. T_f is determined such that only approximately 5% of the observed temperatures are higher. Therefore, T_f is the upper 95th percentile of the effluent temperature distribution.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-11-6. Reasonable potential equations

(a) The maximum temperature difference on the mixing zone boundary must be computed using the following equation to determine if there is a reasonable potential to exceed 2.8°C outside the mixing zone:

$$\therefore T' = (T_f - T_a) / df.$$

The dilution factor, df, must be that which yields the maximum temperature difference on the mixing zone boundary.

(b) Substituting for df, the following equations shall be used for discharges to streams:

$$T' = (1.94Q^* (T_f - T_a)) / (1 + Q^*)$$

when Q^* is less than or equal to 0.1823, or

$$T' = (T_f - T_a) / (6.17 - 15.51Q^*)$$

when Q^* is greater than 0.1823 and less than 0.3333, or

$$T' = T_f - T_a$$

when Q^* is greater than or equal to 0.3333. $Q^* = Q_e/Q_u$ (the dilution capacity).

(c) The following equations shall be used for discharges to lakes:

$$T' = (D(T_f - T_a)) / 20.15$$

when D is greater than or equal to 3 feet. D is pipe

diameter, and

$$T' = (W^{1/2}(T_r - T_a)) / 4.2$$

when W is greater than or equal to 3 feet. W is canal width.
(d) There is a reasonable potential that the effluent may cause a criterion exceedance at the maximum concentration on the mixing zone boundary if T' > 2.8°C.
[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 16 Ok Reg 3258, eff 7-12-99]

785:46-11-7. Wasteload allocation
(a) Conservative substance models will be used for wasteload allocations to implement temperature criteria.

$$WLA = T_a + df\ (T_c - T_a),$$

where df is the dilution factor and $T_c - T_a = 2.8°C$.

$$\therefore WLA = T_a + 2.8df.$$

(b) Substituting the appropriate dilution factors for discharges to streams,

$$WLA = T_a + 1.44\ (1 + Q^*) / Q^*$$

when Q* is less than or equal to 0.1823, or

$$WLA = T_a + 17.276 - 43.428Q^*$$

when Q* is greater than 0.1823 and less than 0.3333, or

$$WLA = T_a + 2.8$$

when Q* is greater than or equal to 0.3333.
(c) Substituting the appropriate dilution factors for discharges to lakes,

$$pipe:\ WLA = T_a + 56.42 / D$$

when D is greater than or equal to 3 feet, or

$$canal:\ WLA = T_a + 11.76 / W^{1/2}$$

when W is greater than or equal to 3 feet.
[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 16 Ok Reg 3258, eff 7-12-99]

SUBCHAPTER 13. IMPLEMENTATION OF ANTIDEGRADATION POLICY

Section
785:46-13-1. Applicability and scope
785:46-13-2. Definitions
785:46-13-3. Tier 1 protection; attainment or maintenance of an existing or designated beneficial use
785:46-13-4. Tier 2 protection; maintenance and protection of High Quality Waters and Sensitive Water Supplies
785:46-13-5. Tier 3 protection; prohibition against degradation of water quality in outstanding resource waters
785:46-13-6. Protection for Appendix B areas

785:46-13-1. Applicability and scope
(a) The rules in this Subchapter provide a framework for implementing the antidegradation policy stated in OAC 785:45-3-2 for all waters of the state. This policy and framework includes three tiers, or levels, of protection.
(b) The three tiers of protection are as follows:
(1) Tier 1. Attainment or maintenance of an existing or designated beneficial use.
(2) Tier 2. Maintenance or protection of High Quality Waters and Sensitive Public and Private Water Supply waters.
(3) Tier 3. No degradation of water quality allowed in Outstanding Resource Waters.
(c) In addition to the three tiers of protection, this Subchapter provides rules to implement the protection of waters in areas listed in Appendix B of OAC 785:45. Although Appendix B areas are not mentioned in OAC 785:45-3-2, the framework for protection of Appendix B areas is similar to the implementation framework for the antidegradation policy.
(d) In circumstances where more than one beneficial use limitation exists for a waterbody, the most protective limitation shall apply. For example, all antidegradation policy implementation rules applicable to Tier 1 waterbodies shall be applicable also to Tier 2 and Tier 3 waterbodies or areas, and implementation rules applicable to Tier 2 waterbodies shall be applicable also to Tier 3 waterbodies.
(e) Publicly owned treatment works may use design flow, mass loadings or concentration, as appropriate, to calculate compliance with the increased loading requirements of this section if those flows, loadings or concentrations were

approved by the Oklahoma Department of Environmental Quality as a portion of Oklahoma's Water Quality Management Plan prior to the application of the ORW, HQW or SWS limitation. [**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-13-2. Definitions

The following words and terms, when used in this Subchapter, shall have the following meaning, unless the context clearly indicates otherwise:

"**Specified pollutants**" means

(A) Oxygen demanding substances, measured as Carbonaceous Biochemical Oxygen Demand (CBOD) and/or Biochemical Oxygen Demand (BOD);

(B) Ammonia Nitrogen and/or Total Organic Nitrogen;

(C) Phosphorus;

(D) Total Suspended Solids (TSS); and

(E) Such other substances as may be determined by the Oklahoma Water Resources Board or the permitting authority.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-13-3. Tier 1 protection; attainment or maintenance of an existing or designated beneficial use

(a) **General.**

(1) Beneficial uses which are existing or designated shall be maintained and protected.

(2) The process of issuing permits for discharges to waters of the state is one of several means employed by governmental agencies and affected persons which are designed to attain or maintain beneficial uses which have been designated for those waters. For example, Subchapters 3, 5, 7, 9 and 11 of this Chapter are rules for the permitting process. As such, the latter Subchapters not only implement numerical and narrative criteria, but also implement Tier 1 of the antidegradation policy.

(b) **Thermal pollution.** Thermal pollution shall be prohibited in all waters of the state. Temperatures greater than 52 degrees Centigrade shall constitute thermal pollution and shall be prohibited in all waters of the state.

(c) **Prohibition against degradation of improved waters.** As the quality of any waters of the state improves, no degradation of such improved waters shall be allowed.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 16 Ok Reg 3258-3259, eff 7-12-99]

785:46-13-4. Tier 2 protection; maintenance and protection of High Quality Waters and Sensitive Water Supplies

(a) **General rules for High Quality Waters.** New point source discharges of any pollutant after June 11, 1989, and increased load or concentration of any specified pollutant from any point source discharge existing as of June 11, 1989, shall be prohibited in any waterbody or watershed designated in Appendix A of OAC 785:45 with the limitation "HQW". Any discharge of any pollutant to a waterbody designated "HQW" which would, if it occurred, lower existing water quality shall be prohibited. Provided however, new point source discharges or increased load or concentration of any specified pollutant from a discharge existing as of June 11, 1989, may be approved by the permitting authority in circumstances where the discharger demonstrates to the satisfaction of the permitting authority that such new discharge or increased load or concentration would result in maintaining or improving the level of water quality which exceeds that necessary to support recreation and propagation of fishes, shellfishes, and wildlife in the receiving water.

(b) **General rules for Sensitive Public and Private Water Supplies.** New point source discharges of any pollutant after June 11, 1989, and increased load of any specified pollutant from any point source discharge existing as of June 11, 1989, shall be prohibited in any waterbody or watershed designated in Appendix A of OAC 785:45 with the limitation "SWS". Any discharge of any pollutant to a waterbody designated "SWS" which would, if it occurred, lower existing water quality shall be prohibited. Provided however, new point source discharges or increased load of any specified pollutant from a discharge existing as of June 11, 1989, may be approved by the permitting authority in circumstances where the discharger demonstrates to the satisfaction of the permitting authority that such new discharge or increased load would result in maintaining or improving the level of water quality which exceeds that necessary to support recreation and propagation of fishes, shellfishes, and wildlife in the receiving water.

(c) **Stormwater discharges.** Regardless of subsections (a) and (b) of this Section, point source discharges of stormwater to waterbodies

and watersheds designated "HQW" and "SWS" may be approved by the permitting authority.

(d) **Nonpoint source discharges.** Best management practices for control of nonpoint source discharges should be implemented in watersheds of waterbodies designated "HQW" or "SWS" in Appendix A of OAC 785:45.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

785:46-13-5. Tier 3 protection; prohibition against degradation of water quality in outstanding resource waters

(a) **General.** New point source discharges of any pollutant after June 11, 1989, and increased load of any pollutant from any point source discharge existing as of June 11, 1989, shall be prohibited in any waterbody or watershed designated in Appendix A of OAC 785:45 with the limitation "ORW" and/or "Scenic River", and in any waterbody located within the watershed of any waterbody designated with the limitation "Scenic River". Any discharge of any pollutant to a waterbody designated "ORW" or "Scenic River" which would, if it occurred, lower existing water quality shall be prohibited.

(b) **Stormwater discharges.** Regardless of 785:46-13-5(a), point source discharges of stormwater from temporary construction activities to waterbodies and watersheds designated "ORW" and/or "Scenic River" may be permitted by the permitting authority. Regardless of 785:46-13-5(a), discharges of stormwater to waterbodies and watersheds designated "ORW" and/or "Scenic River" from point sources existing as of June 25, 1992, whether or not such stormwater discharges were permitted as point sources prior to June 25, 1992, may be permitted by the permitting authority; provided, however, increased load of any pollutant from such stormwater discharge shall be prohibited.

(c) **Nonpoint source discharges.** Best management practices for control of nonpoint source discharges should be implemented in watersheds of waterbodies designated "ORW" in Appendix A of OAC 785:45, provided, however, that development of conservation plans shall be required in sub-watersheds where discharges from nonpoint sources are identified as causing or significantly contributing to degradation in a waterbody designated "ORW".

(d) **LMFO's.** *No licensed managed feeding operation* (LMFO) *established after* June 10, 1998 *which applies for a new or expanding license* from the State Department of Agriculture *after March 9, 1998 shall be located...[w]ithin three (3) miles of any designated scenic river area as specified by the Scenic Rivers Act* in 82 O.S. Section 1451 and following, or *[w]ithin one (1) mile of a waterbody* [2:9-210.3(D)] designated in Appendix A of OAC 785:45 as "ORW".

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96; Amended at 16 Ok Reg 3259, eff 7-12-99]

785:46-13-6. Protection for Appendix B areas

(a) **General.** Appendix B of OAC 785:45 identifies areas in Oklahoma with waters of recreational and/or ecological significance. These areas are divided into Table 1, which includes national and state parks, national forests, wildlife areas, wildlife management areas and wildlife refuges; and Table 2, which includes areas which contain threatened or endangered species listed as such by the federal government pursuant to the federal Endangered Species Act as amended.

(b) **Protection for Table 1 areas.** New discharges of pollutants after June 11, 1989, or increased loading of pollutants from discharges existing as of June 11, 1989, to waters within the boundaries of areas listed in Table 1 of Appendix B of OAC 785:45 may be approved by the permitting authority under such conditions as ensure that the recreational and ecological significance of these waters will be maintained.

(c) **Protection for Table 2 areas.** Discharges or other activities associated with those waters within the boundaries listed in Table 2 of Appendix B of OAC 785:45 may be restricted through agreements between appropriate regulatory agencies and the United States Fish and Wildlife Service. Discharges or other activities in such areas shall not substantially disrupt the threatened or endangered species inhabiting the receiving water.

(d) **Nonpoint source discharges.** Best management practices for control of nonpoint source discharges should be implemented in watersheds located within areas listed in Appendix B of OAC 785:45.

[**Source:** Added at 13 Ok Reg 2891, eff 7-1-96]

APPENDIX A. DILUTIONS FOR TOXICITY TESTING

Whole effluent chronic toxicity testing requires that test organisms be subjected to various effluent dilutions. The dilution series for chronic toxicity testing is based on the low flow dilution (LFD). The chronic low flow dilution equations are as follows:

$$LFD = (1.94Q^*) / (1 + Q^*)$$

when Q^* is less than or equal to 0.1823, or

$$LFD = 1 / (6.17 - 15.51Q^*)$$

when Q^* is greater than 0.1823 and less than 0.3333, or

$$LFD = 1$$

when Q^* is greater than or equal to 0.3333. $Q^* = Q_e/Q_u$. Q_e is the largest thirty day average flow for an industrial discharge, if known, and the design flow otherwise. Q_u is 1 cfs or the 7Q2 receiving stream flow, if known to be larger. Consult the Continuing Planning Process document for additional explanation.

A dilution series for chronic toxicity testing is listed in Table 1 of this Appendix. Percent Low Flow Dilution is given in column 4 of Table 1. The dilution series is based upon this LFD. For example, where an LFD is 30%, the appropriate series would be 13%, 17%, 23%, 30%, and 40%, in addition to the required 0% Control. This series ensures one dilution above the LFD, which aids statistical analysis. For facilities with LFDs greater than 75%, the LFD is the highest dilution used. This will result in four dilutions and the 0% Control below the LFD.

Whole effluent acute toxicity testing requires that test organisms be subjected to various effluent dilutions. The dilution series for acute toxicity testing is based on the acute low flow diluton (LFD). The acute low flow dilution equation is:

$$LFD = Q_e / 100.$$

A dilution series for acute toxicity testing is listed in Table 1 of this Appendix. LFD x 100 (column 4) shall always be one percent (1%) or larger.

TABLE 1.
The 0.75 Dilution Series For Use In Chronic Toxicity Testing

Control				100 X LFD	
0 %	1	2	3	4	5
	0.4	0.6	0.8	1.0	1.3
	0.8	1.1	1.5	2.0	2.7
	1.3	1.7	2.3	3.0	4.0
	1.7	2.3	3.0	4.0	5.3
	2.1	2.8	3.8	5.0	6.7
	2.5	3.4	4.5	6.0	8.0
	3	4	5	7	9
	3	5	6	8	11
	4	5	7	9	12
	4	6	8	10	13
	5	6	8	11	15
	5	7	9	12	16
	5	7	10	13	17
	6	8	11	14	19
	6	8	11	15	20
	7	9	12	16	21
	7	10	13	17	23
	8	10	14	18	24
	8	11	14	19	25
	8	11	15	20	27
	9	12	16	21	28
	9	12	17	22	29
	10	13	17	23	31
	10	14	18	24	32
	11	14	19	25	33
	11	15	20	26	35
	11	15	20	27	36
	12	16	21	28	37
	12	16	22	29	39

Control				100 X LFD	
0 %	1	2	3	4	5
	13	17	23	30	40
	13	17	23	31	41
	14	18	24	32	43
	14	19	25	33	44
	14	19	26	34	45
	15	20	26	35	47
	15	20	27	36	48
	16	21	28	37	49
	16	21	29	38	51
	16	22	29	39	52
	17	23	30	40	53
	17	23	31	41	55
	18	24	32	42	56
	18	24	32	43	57
	19	25	33	44	59
	19	25	34	45	60
	19	26	35	46	61
	20	26	35	47	63
	20	27	36	48	64
	21	28	37	49	65
	21	28	38	50	67
	22	29	38	51	68
	22	29	39	52	69
	22	30	40	53	71
	23	30	41	54	72
	23	31	41	55	73
	24	32	42	56	75
	24	32	43	57	76
	24	33	44	58	77
	25	33	44	59	79
	25	34	45	60	80

Control				100 X LFD	
0 %	1	2	3	4	5
	26	34	46	61	81
	26	35	47	62	83
	27	35	47	63	84
	27	36	48	64	85
	27	37	49	65	87
	28	37	50	66	88
	28	38	50	67	89
	29	38	51	68	91
	29	39	52	69	92
	30	39	53	70	93
	30	40	53	71	95
	30	41	54	72	96
	31	41	55	73	97
	31	42	56	74	99
	32	42	56	75	100
24	32	43	57	76	
24	32	43	58	77	
25	33	44	59	78	
25	33	44	59	79	
25	34	45	60	80	
26	34	46	61	81	
26	35	46	62	82	
26	35	47	62	83	
27	35	47	63	84	
27	36	48	64	85	
27	36	48	65	86	
28	37	49	65	87	
28	37	50	66	88	
28	38	50	67	89	
28	38	51	68	90	
29	38	51	68	91	

Control				100 X LFD	
0 %	1	2	3	4	5
29	39	52	69	92	
29	39	52	70	93	
30	40	53	71	94	
30	40	53	71	95	
30	41	54	72	96	
31	41	55	73	97	
31	41	55	74	98	
31	42	56	74	99	
32	42	56	75	100	

[**Source**: Revoked and reenacted at 16 Ok Reg 3260-3264, eff 7-12-99]