

Chapter NR 106

PROCEDURES FOR CALCULATING WATER QUALITY BASED EFFLUENT LIMITATIONS FOR TOXIC AND ORGANOLEPTIC SUBSTANCES DISCHARGED TO SURFACE WATERS

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Note: Corrections made under s. 13.93 (2m) (b) 7., Stats., Register, August, 1997, No. 500.

NR 106.01 Purpose. One purpose of this chapter is to specify how the department will calculate water quality based effluent limitations under s. 283.13 (5), Stats., for toxic and organoleptic substances and whole effluent toxicity. The other purpose of this chapter is to specify how the department will decide if and how these limitations will be included in Wisconsin pollution discharge elimination system (WPDES) permits. Water quality based effluent limitations for toxic and organoleptic substances are needed to assure attainment and maintenance of surface water quality standards as established in accordance with s. 281.15 (1) (b), Stats., and as set forth in chs. NR 102 to 105.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89.

NR 106.02 Applicability. The provisions of this chapter are applicable to point sources which discharge wastewater containing toxic or organoleptic substances to surface waters of the state.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89.

NR 106.03 Definitions. The following definitions are applicable to terms used in this chapter.

(1) "Bioaccumulative chemical of concern" or "BCC" means any substance that has the potential to cause adverse effects which, upon entering the surface waters, accumulates in aquatic organisms by a human health or wildlife bioaccumulation factor greater than 1000.

(2) "Biologically based design flow" means a receiving water design flow to protect fish and aquatic life for which both the duration of exposure is expressed in days and the allowable frequency of excursion is expressed in years. An example of a biologically based design flow is a 4-day 3-year design flow which corresponds to the lowest 4-day average flow that will limit excursions from any water quality criteria or secondary values to no more than once in 3 years.

(3) "Dynamic models" means computer simulation models which use real or derived time series data to predict a time series of observed or derived receiving water concentrations. Methods include continuous simulation, Monte Carlo simulations, or other similar statistical or deterministic techniques.

(4) "EC₅₀" means the point estimate of the concentration of a toxic substance, wastewater effluent or other aqueous mixture which causes an adverse effect including mortality to 50% of the exposed organisms in a given time period, when compared to an appropriate control.

(5) "IC₂₅" means the point estimate of the concentration of a toxic substance, wastewater effluent or other aqueous mixture that would cause a 25% reduction in a nonlethal biological measure-

ment, such as reproduction or growth, of the exposed test organisms in a given time period.

(6) "IWC" or "instream waste concentration" means the concentration of a toxicant or the parameter toxicity in the receiving water after mixing.

(7) "LC₅₀" means the point estimate of the concentration of a toxic substance, wastewater effluent or other aqueous mixture which is lethal to 50% of the exposed organisms in a given time period, when compared to an appropriate control.

(8) "Limit of detection" or "LOD" means the lowest concentration level that can be determined to be significantly different from a blank for that analytical test method and sample matrix.

(9) "Limit of quantitation" or "LOQ" means the concentration of an analyte at which one can state with a degree of confidence for that analytical test method and sample matrix that an analyte is present at a specific concentration on the sample tested.

(10) "NOEC" means the highest tested concentration of a toxic substance, wastewater effluent or other aqueous mixture at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. The NOEC is determined using hypothesis testing.

(11) "rTU_c" or "relative toxic unit chronic" means the IWC divided by the IC₂₅.

(12) "Toxicity test" means a test which determines the toxicity of a chemical substance, wastewater effluent or other aqueous mixture using living organisms. A toxicity test measures the degree of response of exposed test organisms to a chemical substance, wastewater effluent or other aqueous mixture.

(13) "TU_a" or "toxic unit acute" means 100 divided by the LC₅₀.

(14) "Whole effluent toxicity" means the aggregate toxic effect of an effluent as measured directly by a toxicity test.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; r. (7), renun. (1) to (6), (8) and (9) to be (4), (7) to (9), (12) and (14) and am. (2), (4), (7) and (12), cr. (1), (5), (6), (10), (11) and (13), Register, August, 1997, No. 500, eff. 9-1-97.

NR 106.04 General. (1) Water quality based effluent limitations shall be established whenever categorical effluent limits required under s. 283.13, Stats., are less stringent than necessary to achieve applicable water quality standards specified in chs. NR 102 to 105. Water quality based effluent limitations for a point source shall be specified in the WPDES permit for that point source.

(2) In no case may the water quality based effluent limitations be less stringent than applicable categorical effluent limitations.

(3) The department shall establish limitations for toxic and organoleptic substances if any of the conditions specified in s. NR 106.05 are met. Limitations shall be established according to the

methods provided in s. NR 106.06 and included in WPDES permits according to the conditions provided in s. NR 106.07. The department shall establish limitations for whole effluent toxicity if any of the conditions specified in s. NR 106.08 are met. Whole effluent limitations shall be established and included in WPDES permits according to the methods provided in ss. NR 106.08 and 106.09.

(4) Water quality based effluent limitations or monitoring requirements for toxic or organoleptic substances or whole effluent toxicity may be removed from a permit, subject to public notice and opportunity for hearing under ch. NR 203, if the limitation is determined to be unnecessary based on the procedures presented in this chapter or based on other information available to the department.

(5) For purposes of this chapter, a cost-effective pollutant minimization program is an activity which has as its goal the reduction of all potential sources of the pollutant for the purpose of maintaining the effluent at or below the water quality based effluent limitation. The pollutant minimization programs specified in ss. NR 106.05 (8), 106.06(6) (d) and 106.07(6) (f) shall include investigation of treatment technologies and efficiencies, process changes, wastewater reuse or other pollution prevention techniques that are appropriate for that facility, taking account of the permittee's overall treatment strategies, facilities plans and operational circumstances. Past documented pollution prevention or treatment efforts may be used to satisfy all or part of a pollution minimization program requirement. The permittee shall submit to the department an annual status report on the progress of a pollutant minimization program.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; am. (3), cr. (5), Register, August, 1997, No. 500, eff. 9-1-97.

NR 106.05 Determination of the necessity for water quality based effluent limitations for toxic and organoleptic substances. (1) (a) *General.* The department shall establish water quality based effluent limitations for point source dischargers whenever the discharges from those point sources contain(s) toxic or organoleptic substances at concentrations or loadings which do not, as determined by any method in this section, meet applicable water quality standards specified in chs. NR 102 to 105.

(b) *Determining necessity for limitations based on secondary values.* The department may establish water quality based effluent limitations for point source discharges based on secondary values calculated according to ch. NR 105. The department shall calculate secondary values and establish limitations for toxic and organoleptic substances in permits based on secondary values when, in the judgment of the department, one or more of the following factors support the necessity for the values, in conjunction with the procedures in subs. (2) to (8).

1. Whole effluent toxicity or other biomonitoring or bioassay test results indicate toxicity to test or other species.
2. The use designation of the receiving water is or may be impaired.
3. There is other information that the industrial category or subcategory of the point source or the industrial or other sources discharging to a publicly owned treatment works discharges the substance.
4. The substance in the wastewater will not be adequately removed or reduced by the type of wastewater treatment provided.
5. The ecological or environmental risk from the substance may be significant when discharged to surface waters.
6. Other relevant factors which may cause an adverse effect on surface waters as specified in s. NR 105.04(1).

(c) If the department determines that a limitation based on an aquatic life acute or chronic secondary value should be established in a permit according to the provisions in this section, a per-

mittee may request an alternative wet limit in accordance with s. NR 106.07 (7).

Note: A toxic or organoleptic substance includes, but is not limited to, those substances in Table 6 of 40 CFR part 132.

(2) When considering the necessity for water quality based effluent limitations, the department shall consider in-stream bio-survey data and data from ambient toxicity analyses whenever such data are available.

(3) If representative discharge data are available for a toxic or organoleptic substance being discharged from a point source, limitations shall be established in accordance with any one of the following conditions:

(a) The discharge concentration of the substance for any day exceeds the limit of detection and exceeds the limitations based on either the acute toxicity criterion or secondary acute value for the substance as determined in s. NR 106.06 (3) where appropriate,

(b) The arithmetic average discharge concentration of the substance for any 4 consecutive days calculated as described in sub. (7) exceeds the limit of detection and exceeds the limitations based on either the chronic toxicity criterion or secondary chronic value for the substance as determined in s. NR 106.06 (4).

(c) The arithmetic average discharge concentration of the substance for any 30 consecutive days calculated as described in sub. (7) exceeds the limit of detection and exceeds any limitation based on the wildlife, human threshold, or human cancer criteria or secondary values, or taste and odor criteria for the substance as determined in s. NR 106.06 (4).

(4) If at least 11 daily discharge concentrations of the substance are greater than the limit of detection and the requirements of sub. (3) do not result in the need for an effluent limitation, water quality based effluent limitations are necessary for a substance in a point source discharge if the upper 99th percentile of available discharge concentrations as calculated in sub. (5) meets any of the conditions specified in pars. (a) to (c).

(a) The upper 99th percentile of daily discharge concentrations of the substance exceeds the limitation based on either the acute toxicity criterion or the secondary acute value for the substance as determined in s. NR 106.06 (3).

(b) The upper 99th percentile of 4-day average discharge concentration of the substance exceeds the limitation based on either the chronic toxicity criterion or the secondary chronic value for the substance as determined in s. NR 106.06 (4), or

(c) The upper 99th percentile of 30-day average discharge concentration of the substance exceeds any limitation based on the wildlife, human threshold, or human cancer criteria or secondary value, or taste and odor criteria for the substance as determined in s. NR 106.06 (4).

(5) This subsection shall be used to calculate upper 99th percentile values unless a probability distribution other than log normal is determined to be more appropriate and alternate methods to calculate the upper 99th percentile are available.

(a) When available daily discharge concentrations of the substance are not serially correlated and at least 11 concentrations are greater than the limit of detection, the upper 99th percentile of the daily average, the 4-day average and the 30-day average discharge concentrations may be calculated as follows:

$$P_{99} = \exp(\mu_{dn} + Z_p \sigma_{dn})$$

Where:

- P_{99} = Upper 99th percentile of n-day average discharge concentrations.
- d = Ratio of the number of daily discharge concentrations less than the limit of detection to the total number of discharge concentrations.

- n = Number of discharge concentrations used to calculate an average over a specified monitoring period ($n=1$ for daily concentrations, 4 for 4-day averages and 30 for 30-day averages).
- \exp = Base e (or approximately 2.718) raised to the power shown between the parentheses in the original equation.
- Z_p = Z value corresponding to the upper p^{th} percentile of the standard normal distribution.
- P = $(0.99-d^n)/(1-d^n)$.
- μ_{dn} = $\mu_d + [(\sigma_{dn})^2 - (\sigma_{dn})^2] + \ln[(1-d)/(1-d^n)]$
 μ_d = estimated log mean of n -day average discharge concentrations greater than the limit of detection. (Note: $\mu_{dn} = \mu_d$ if $n = 1$).
- $(\sigma_{dn})^2$ = $\ln \left[\frac{(1-d^n) \left[(1+(s/m)^2)/n(1-d) + (n-1)/n \right]}{(1-d)^n} \right]$ = estimated log variance of n -day average discharge concentrations greater than the limit of detection. (Note: $(\sigma_{dn})^2 = (\sigma_d)^2$ if $n = 1$).
- μ_d = $\ln m - 0.5 (\sigma_d)^2$ = estimated log mean of discharge concentrations greater than the limit of detection.
- $(\sigma_d)^2$ = $\ln [1 + (s/m)^2]$ = estimated log from variance of discharge concentrations greater than the limit of detection.
- \ln = Natural logarithm.
- m = Mean of discharge concentrations greater than the limit of detection.
- s = Standard deviation of discharge concentrations greater than the limit of detection.

(b) When the daily discharge concentrations of any substance are serially correlated, the serially correlated data may be adjusted using appropriate methods such as that presented in Appendix E of "Technical Support Document for Water Quality-based Toxics Control", U.S. environmental protection agency, March 1991 (EPA/505/2-90-001). The equation presented in par. (a) may be used after adjustment of the serially correlated data.

(6) If less than 11 daily discharge concentrations of the substance are greater than the limit of detection, and the requirements in sub. (3) do not result in an effluent limitation, water quality based effluent limitations are necessary for a substance in a point source discharge if the arithmetic average of available discharge concentrations as calculated in sub. (7) exceeds any value determined in par. (a) or (b):

(a) One fifth of the limitation based on the acute toxicity criterion or secondary acute value for the substance, as determined in s. NR 106.06 (3) where appropriate, or

(b) One fifth of any limitation based on chronic toxicity criteria or secondary chronic values or long-term impacts as determined in s. NR 106.06 (4).

(7) The arithmetic average discharge concentration as used in subs. (3) and (6) shall be calculated using all available discharge data treated according to this subsection.

(a) If, in the judgment of the department, the analytical methods used to test for the substance represent acceptable methods, all values reported as less than the limit of detection shall be set equal to zero for calculation of the average concentration.

(b) If, in the judgment of the department, the analytical methods used to test for the substance do not represent the best acceptable methods, all values reported as less than the limit of detection shall be discarded from the data.

(8) When the provisions of this section cannot be invoked because representative discharge data are not available for a substance, water quality based effluent limitations may be established if, in the judgment of the department, water quality standards will be exceeded if the discharge from the point source is not limited. If, in the judgment of the department, the discharge from a point source may exceed the water quality standards, but the collection of representative discharge data is not possible due to the inability of the most sensitive approved method to quantify discharge levels and, in the judgment of the department the application numeric

effluent limitations in a permit is infeasible or impractical, then the permittee may request an alternative to a numerical effluent limitation. The alternative shall consist of a permit requirement to conduct a cost-effective pollutant minimization program as specified in s. NR 106.04 (5). Approved methods are those specified in ch. NR 219 or 40 CFR part 136.

Note: A department guidance document finalized in May 1996, entitled "Wisconsin Strategy for Regulating Mercury in Wastewater", describes how the department evaluates whether an effluent limitation or a pollutant minimization program for mercury is appropriate.

(9) Regardless of the results of the analysis conducted under this section, the department may, whenever determined necessary, require monitoring for any toxic or organoleptic substance.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; renum. (1) to be (1) (a), cr. (1) (b) and (c), am. (3) (a) to (c), (4) (a) to (c), (5) (b), (6) (a) and (b) and (8), Register, August, 1997, No. 500, eff. 9-1-97.

NR 106.06 Calculation of water quality based effluent limitations for toxic and organoleptic substances.

(1) BASIS FOR LIMITATIONS. (a) The department shall establish water quality based effluent limitations for point source dischargers whenever such limitations are necessary, as determined by any method in this section, to meet the applicable water quality standards, criteria and secondary values as determined in chs. NR 102 to 105.

(b) 1. Water quality based effluent limitations for toxic and organoleptic substances shall be determined to attain and maintain water quality standards and criteria or secondary values, specified in or determined according to procedures in ch. NR 105, at the point of discharge. Effluent limitations shall be established to protect downstream waters whenever the department has information to make the determinations.

2. For discharges to Green Bay that are north of 44° 32' 30" north latitude, the cold water community criteria shall apply in effluent limit calculations. For discharges to Green Bay that are south of 44° 32' 30" north latitude, effluent limitations shall be established in accordance with subd. 1.

(2) LIMITATIONS FOR BIOACCUMULATIVE CHEMICALS OF CONCERN (BCCS). (a) Notwithstanding any other provisions in chs. NR 102 and 106, beginning on March 23, 1997, effluent limitations for new or expanded discharges of BCCs into waters of the Great Lakes system as defined in s. NR 102.12 may not exceed the most stringent applicable water quality criteria or secondary values for BCCs. Effluent limitations for expanded discharges of BCCs with permit limitations shall be determined by means of a mass balance where the limitation for the existing portion of a permitted discharge shall be determined using the requirements of sub. (4) and the limitation for the expanded portion of the discharge may not exceed the most stringent criteria or value for that BCC.

(b) For the purposes of par. (a), "expanded discharge" means any change in concentration, level or loading of a substance which would exceed a limitation specified in a current WPDES permit, or which, according to the procedures in s. NR 106.05 would result in the establishment of a new limitation in a reissued or modified WPDES permit. "New discharge" means any point source which has not received a WPDES permit from the department prior to September 1, 1997.

Note: The Great Lakes Water Quality Initiative requires that for existing discharges of BCCs in waters of the Great Lakes system, effluent limitations may not exceed the most stringent criteria or secondary value beginning March 23, 2007, with two exceptions. Prior to that date, DNR will develop additional rules to implement this requirement for existing discharges.

(c) Effluent limitations for discharges of BCCs into waters of the Great Lakes system as defined in s. NR 102.12 that are based on human health criteria or secondary values calculated according to procedures in ch. NR 105, shall be also based on the most protective designated use: cold water, public water supply.

(3) LIMITATIONS BASED ON ACUTE TOXICITY. (a) The department shall establish water quality based effluent limitations to ensure that substances are not present in amounts which are acutely harmful to animals, plants or aquatic life in all surface

waters including those portions of the mixing zone normally habitable by aquatic life and effluent channels as required by s. NR 102.04 (1).

(b) To assure compliance with par. (a) and except as provided in par. (c), water quality based effluent limitations shall equal the final acute value as determined in s. NR 105.05 or the secondary acute value as determined in s. NR 105.05 (4) for the respective fish and aquatic life subcategory for which the receiving water is classified. Effluent limitations for substances for which criteria may be expressed as dissolved concentrations may be established according to sub. (7).

(c) Except as provided in par. (d), water quality based effluent limitations may exceed the final acute value or the secondary acute value within a zone of initial dilution provided that the acute toxicity criteria or secondary acute values are met within a short distance from the point of discharge. A zone of initial dilution shall only be provided if the discharger demonstrates to the department that mixing of the effluent with the receiving water in the zone of initial dilution is rapid and all the following conditions are met:

1. The discharge is not at the water surface or at the shoreline.
2. The discharge does not constitute a significant portion of the streamflow or otherwise dominate the receiving water.
3. The discharge velocity is not less than 3 meters per second (10 feet per second) unless an alternative discharge velocity, which similarly minimizes organism exposure time, is determined appropriate for the specific site.
4. The acute toxicity criteria or secondary acute values must be met within 10% of the distance from the edge of the outfall structure to the edge of a mixing zone which may be determined in accordance with s. NR 102.05 (3).
5. The acute toxicity criteria or secondary acute values shall be met within a distance of 50 times the discharge length scale in any direction. The discharge length scale is defined as the square root of the cross-sectional area of any discharge outlet. If a multiport diffuser is used, this requirement must be met for each port using the appropriate discharge length scale for that port.
6. The acute toxicity criteria or secondary acute values shall be met within a distance of 5 times the local water depth in any horizontal direction from any discharge outlet. The local water depth is defined as the natural water depth (existing prior to the installation of the discharge outlet) prevailing under the mixing zone design conditions for the site.

(d) For toxic substances with water quality criteria related to one or more other water quality parameters, effluent limitations shall be calculated using the effluent value for the water quality parameter. Water quality parameters include, but are not limited to, pH, temperature and hardness.

(4) **LIMITATIONS BASED ON CHRONIC TOXICITY OR LONG-TERM IMPACTS.** (a) *Water quality criteria and secondary values.* The department shall calculate water quality based effluent limitations to ensure that the chronic toxicity criteria (CTC), the wildlife criteria (WC), the taste and odor criteria (TOC), the human threshold criteria (HTC), and human cancer criteria (HCC) appropriate for the receiving water as specified in chs. NR 102 to 105 and the secondary chronic values determined according to ch. NR 105 will be met after dilution with an appropriate allowable quantity of receiving water flow as specified in this subsection, subs. (5) to (11) and s. NR 106.11. The available dilution shall be determined according to par. (c) unless the conditions specified in s. NR 102.05 (3) or sub. (2) require less dilution or no dilution be allowed. Effluent limitations for substances for which criteria may be expressed as dissolved concentrations may be established according to sub. (7).

(b) *Calculation of limits.* Water quality based effluent limitations to meet the requirements of this subsection shall be calcu-

lated using the procedure specified in subd. 1. or 2., except as provided in sub. (2) or (6).

1. For discharges of toxic or organoleptic substances to flowing receiving waters, the water quality based effluent limitation for a substance shall be calculated using the following conservation of mass equation whenever the background concentration is less than the water quality criterion or secondary value:

$$\text{Limitation} = \frac{(\text{WQC})(Q_s + (1-f)Q_e) - (Q_s - fQ_e)(C_s)}{Q_e}$$

Where:

- Limitation = Water quality based effluent limitation (in units of mass per unit of volume),
- WQC = The water quality criterion or secondary value concentration (in units of mass per unit volume) as referenced in sub. (1) or par. (a)
- Q_s = Receiving water design flow (in units of volume per unit time) as specified in par. (c),
- Q_e = Effluent flow (in units of volume per unit time) as specified in par. (d),
- f = Fraction of the effluent flow that is withdrawn from the receiving water, and
- C_s = Background concentration of the substance (in units of mass per unit volume) as specified in par. (e).

Note: In applying this equation, all units for the flow and concentration parameters respectively, shall be consistent.

2. For discharges of toxic or organoleptic substances to receiving waters which do not exhibit a unidirectional flow at the point of discharge, such as lakes or impoundments, the department may calculate, in the absence of specific data, water quality based effluent limitations using the following equation whenever the background concentration is less than the water quality criterion or secondary value:

$$\text{Limitation} = 11(\text{WQC}) - 10C_s$$

Where:

- Limitation = Water quality based effluent limitation (in units of mass per unit of volume)
- WQC = The water quality criterion concentration or secondary value (in units of mass per unit volume) as referenced in sub. (1) or par. (a).
- C_s = Background concentration of the substance (in units of mass per unit volume) as specified in par. (e).

On a case-by-case basis other dilutional factors may be used, but in no case may the dilution allowed exceed an area greater than the area where discharge induced mixing occurs. The discharge is also subject to the conditions specified in s. NR 102.05 (3). The discharger may be required to determine the size of the mixing zone using acceptable models or dye studies.

3. The limitation calculated in subd. 1. or 2. may be converted to a maximum load limitation by multiplying the calculated concentration limitation by the rate of effluent flow as determined in par. (d) and appropriate conversion factors.

(c) *Receiving water design flow (Q_s).* The value of Q_s to be used in calculating the effluent limitation for discharges to flowing waters shall be determined as follows:

1. The department shall make reasonable efforts to determine the area of the zone of passage and the dilution characteristics of discharges.
2. The department may require that the discharger provide information on the discharge mixing and dilution characteristics of discharges.
3. The discharger shall be allowed to demonstrate, through appropriate and reasonable methods that an adequate zone of free

passage exists in the cross-section of the receiving water or that dilution is accomplished rapidly such that the extent of the mixing zone is minimized. In complex situations, the department may require that the demonstration under this subdivision include water quality modeling or field dispersion studies.

4. Following the determinations under subds. 1. to 3., the value of Q_s of the receiving water for calculating effluent limitations based upon the chronic toxicity criteria specified in s. NR 105.06 or secondary chronic values shall be determined on a case-by-case basis. In no case may Q_s exceed the larger of the average minimum 7-day flow which occurs once in 10 years (7-day Q_{10}) or, if sufficient information is available to calculate a biologically based receiving water design flow, the flow which prevents an excursion from the criterion or secondary value using a duration of 4 days and a frequency of less than once every 3 years (4-day, 3-year biological flow).

5. If the requirements of subds. 2. and 3. are not satisfied, the department shall notify the permittee and identify the deficiencies and allow additional time, if necessary, to complete the demonstration. If the demonstration cannot be completed satisfactorily, the value of Q_s of the receiving water for calculating effluent limitations based upon the chronic toxicity criteria specified in s. NR 105.06 or secondary chronic values shall equal $1/4$ of the 7-day Q_{10} or $1/4$ of the 4-day, 3 year biological flow. In no case may the value of Q_s of the receiving water, for calculating effluent limitations based upon the chronic toxicity criteria or secondary chronic values developed according to ch. NR 105, exceed $1/4$ of the 7-day Q_{10} or $1/4$ of the 4-day, 3-year biological flow if the department determines that the discharge has a potential to jeopardize the continued existence of any endangered or threatened species listed under ch. NR 27 and conforming to section 7 of the endangered species act, 16 USC 1536.

6. Q_s may be reduced from those values calculated in subds. 3. to 5. where natural receiving water flow is significantly altered by flow regulation.

7. Following the determinations under subds. 1. to 3., the value of Q_s of the receiving water for calculating effluent limitations based upon the wildlife criteria or secondary values developed according to ch. NR 105 shall be determined on a case-by-case basis. In no case may the Q_s exceed the average minimum 90-day flow which occurs once in 10 years (90-day Q_{10}) or if the 90-day Q_{10} flow is not available, the average minimum 30-day flow which occurs once in 5 years (30-day Q_5) or 85% of the average minimum 7-day flow which occurs once in 2 years (7-day Q_2).

8. If the requirements of subds. 2. and 3. are not satisfied, the department shall notify the permittee and identify the deficiencies and allow additional time, if necessary, to complete the demonstration. Except as provided in subd. 12., if the demonstration cannot be completed satisfactorily, the value of Q_s of the receiving water for calculating effluent limitations based upon the wildlife criteria specified in s. NR 105.07 shall equal $1/4$ of the 90-day Q_{10} or $1/4$ of the 30-day Q_5 or $1/4$ of 85% of the 7-day Q_2 . In no case may the value of Q_s of the receiving water, for calculating effluent limitations based upon the wildlife criteria or secondary values developed according to ch. NR 105, exceed $1/4$ of the 90-day Q_{10} or $1/4$ of the 30-day Q_5 or $1/4$ of 85% of the 7-day Q_2 if the department determines that the discharge has a potential to jeopardize the continued existence of any endangered or threatened species listed under ch. NR 27 and conforming to section 7 of the endangered species act, 16 USC 1536.

9. Except as provided in subd. 12., following the determinations under subds. 1. to 3., the value of Q_s of the receiving water for calculating effluent limitations based upon the human cancer criteria, human threshold criteria or secondary values developed according to ch. NR 105 shall be determined on a case-by-case basis. In no case may Q_s exceed the harmonic mean flow.

10. If the requirements of subds. 2. and 3. are not satisfied, the department shall notify the permittee and identify the deficiencies and allow additional time, if necessary, to complete the demonstration. Subject to subd. 12, if the demonstration cannot be completed satisfactorily, the value of Q_s of the receiving water for calculating effluent limitations based upon the human cancer criteria or secondary values or the human threshold criteria or secondary values specified in ch. NR 105 shall equal $1/4$ of the harmonic mean flow.

11. Except as provided in subd. 12., the value of Q_s shall equal the mean annual flow of the receiving water for calculating effluent limitations based upon the taste and odor criteria as specified in ch. NR 102.

12. Q_s may be reduced from those values calculated in subd. 9., 10., and 11., whenever the department determines such discharges may directly affect public drinking water supplies.

(d) *Effluent flows (Q_e)*. 1. For dischargers subject to ch. NR 210 and which discharge for 24 hours per day on a year-round basis, Q_e shall equal the maximum effluent flow, expressed as a daily average, that is anticipated to occur for 12 continuous months during the design life of the treatment facility unless it is demonstrated to the department that such a design flow rate is not representative of projected flows at the facility.

2. For all other dischargers not subject to ch. NR 210, Q_e shall equal either subd. 2.a. or b. for effluent limitations based on aquatic life chronic criteria or chronic secondary values, and shall equal either subd. 2.a. or c. for effluent limitations based on wildlife, human threshold, human cancer or taste and odor criteria or secondary values. Whenever calculating Q_e , the department may consider a projected increase in effluent flow that will occur when production is increased or modified, or another wastewater source, including stormwater, is added to an existing wastewater treatment facility. This subdivision does not waive the requirements of ch. NR 207.

a. The maximum effluent flow, expressed as a daily average, that has occurred for 12 continuous months and represents normal operations; or

b. The maximum effluent flow, expressed as a daily average, that has occurred for 7 continuous days and represents normal operations; or

c. The maximum effluent flow, expressed as a daily average, that has occurred for 30 continuous days and represents normal operations.

3. For seasonal discharges, discharges proportional to stream flow, or other unusual discharge situations, Q_e shall be determined on a case by case basis.

(e) *Background concentrations of toxicant or organoleptic substances. (Cs)*. The representative background concentration of a toxic or organoleptic substance shall be used in deriving chemical specific water quality based effluent limitations. Except as provided elsewhere in this paragraph, the representative background concentration shall equal the geometric mean of the acceptable available data for a substance. Background concentrations may not be measured at a location within the direct influence of a point source discharge.

1. The department shall determine representative background concentrations of toxic substances on a case-by-case basis using available data on the receiving water or similar waterbodies in the state, including acceptable and available caged or resident fish tissue data, available or projected pollutant loading data, and best professional judgment.

2. The department may utilize representative seasonal concentrations and may consider other information on background concentrations submitted to the department.

3. When evaluating background concentration data, commonly accepted statistical techniques shall be used to evaluate

data sets consisting of values both above and below the level of detection. When all of the acceptable available data in a data set category, such as water column, caged or resident fish tissue, are below the level of detection for a pollutant, then all the data for that pollutant in that data set shall be assumed to be zero.

(5) **VALUES FOR PARAMETERS WHICH AFFECT THE LIMIT.** For toxic substances with water quality criteria related to one or more other water quality parameters, the department may calculate effluent limitations in consideration of those other water quality parameters. Water quality parameters include but are not limited to pH, temperature and hardness. The department shall determine the value of the water quality parameters on a case-by-case basis as follows:

(a) *Receiving water.* 1. The geometric mean of available data for the receiving water shall be used, except the arithmetic mean for pH shall be used.

2. Representative seasonal values may be used.

3. If information on the water quality parameters is not available, then information on the quality of similar water bodies in the area and best professional judgment may be used.

4. The receiving water value of the water quality parameter shall be used to determine the effluent limitation. The receiving water value may be modified to account for the mixture of the receiving and effluent flows when any of the following conditions occur:

a. When the value of the water quality parameter in the effluent is significantly greater than or less than the value in the receiving water;

b. When the effluent flow is relatively large in comparison to the receiving water flow used in the calculation of the effluent; or

c. When, as a result of demonstrated or measured physical, chemical or biological reactions, the value of the water quality parameter, after mixing of the receiving water and the effluent, is significantly different than the background value of the water quality parameter in the receiving water.

(b) *Effluent.* 1. The geometric mean of available data for the effluent shall be used, except the arithmetic mean for pH shall be used.

2. If information on the water quality parameters is not available, then values representative of similar effluents may be used.

(6) **ALTERNATIVE EFFLUENT LIMITATIONS BASED UPON BACKGROUND CONCENTRATIONS.** (a) Whenever the representative background concentration for a toxic or organoleptic substance in the receiving water is determined to be greater than any applicable water quality standard or criterion or secondary value for that substance and the source of at least 90% of the wastewater is from groundwater or a public drinking water supply, the effluent limitation for that substance without dilution shall be equal to the lowest applicable water quality standard or criterion or secondary value except as provided by par. (b).

(b) The department may establish limitations greater than the applicable water quality standard or criterion or secondary value for the substance as required by par. (a) up to the representative background concentration of the substance in the receiving water, or an alternate limitation or requirement may be determined according to par. (d). The limitation, or alternate limitation or requirement determined according to par. (d), shall only be increased above the standard or criterion if it is demonstrated to the department that the concentration of the substance in the groundwater or public drinking water supply or other source water at the point of intake exceeds the applicable standard or criterion for that substance and that reasonable, practical or otherwise required methods are implemented to minimize the addition of the toxic or organoleptic substance to the wastewater. This subdivision shall not apply where groundwater is withdrawn from a location because of noncompliance with the standards contained in ch. NR 140.

(c) 1. Whenever the representative background concentration for a toxic or organoleptic substance in the receiving water is determined to be greater than any applicable water quality standard or criteria for that substance and the source of more than 10% of the wastewater for any discharger is from the same receiving water, the effluent limitation for that substance shall, except as provided in subd. 2., equal the representative background toxic concentration of that substance in the receiving water as determined by the department, or an alternate limitation or requirement may be determined according to par. (d).

2. The department may establish an effluent limitation more stringent than the representative background concentration when the existing treatment system has a demonstrated and cost-effective ability to achieve regular and consistent compliance with a limitation more stringent than the representative background concentration.

(d) Where appropriate, for effluent limitations determined under pars. (b) and (c), the department may conduct an analysis for a toxic or organoleptic substance which accounts for all sources of the pollutant impacting a waterbody or stream segment. In the event the discharger's relative contribution to the mass of the toxic or organoleptic substance impacting the waterbody or stream segment is negligible in the best professional judgment of the department, and the concentration of the substance in the discharge exceeds the representative background concentration of the substance, the department shall establish an alternative effluent limitation for the discharger. In determining whether the discharger's relative contribution to the mass of the substance is negligible, consideration shall be given to the type of substance being limited, the uses of the receiving water potentially affected and other relevant factors. The alternative effluent limitation or other requirement shall represent in the judgment of the department, application of the best demonstrated treatment technology reasonably achievable. An alternative effluent limitation or other requirement may include one or more of the following permit conditions:

1. A numerical limitation for the substance;

2. A monitoring requirement for the substance; or

3. A cost-effective pollutant minimization program for the substance as defined in s. NR 106.04(5).

Note: The analysis which may be conducted to determine the relative contributions of various sources of pollutants discharged to surface waters is functionally equivalent to the type of analysis described in 40 CFR 130.7.

(e) The determination of representative background concentrations for toxic or organoleptic substances in pars. (b) and (c) shall be statistically ($P \leq 0.01$) or otherwise appropriately determined as the reasonably expected maximum background concentration for that substance.

(7) **APPLICABILITY OF WATER QUALITY CRITERIA EXPRESSED AS DISSOLVED CONCENTRATIONS.** Effluent limitations may be established in a permit under this subsection based upon the acute and chronic aquatic life toxicity criteria expressed as dissolved concentrations which are determined using the procedures specified in ss. NR 105.05(5) and 105.06(8).

(a) Determine the effluent limitations according to the procedures specified in this chapter using the water quality criteria expressed as total recoverable from tables 1 to 6 in ch. NR 105. Determine the necessity for water quality based effluent limitations according to s. NR 106.05. If the procedures in s. NR 106.05 do not result in the need for effluent limitations based upon the total recoverable criteria, then no limitations shall be established in the permit and there is no further review. If the procedures in s. NR 106.05 do result in the need for effluent limitations based upon the total recoverable criteria, then the limitations shall be established in the permit or the permittee may request that effluent limitations be established based on criteria expressed as dissolved concentrations according to par. (b).

(b) If, following the procedures in par. (a), the permittee requests that effluent limitations be established based on criteria expressed as dissolved concentrations, the department shall determine the effluent limitations according to the procedures specified in this chapter using WQ_{TRAN} , the water quality criterion expressed as a dissolved concentration, and shall determine the necessity for water quality based effluent limitations according to s. NR 106.05. If the procedures in s. NR 106.05 do not result in the need for effluent limitations based upon the criteria expressed as dissolved concentrations, WQ_{TRAN} , then no limitations shall be established in the permit and the monitoring conditions in par. (c)1. shall be included in the permit. If the procedures in s. NR 106.05 do result in the need for effluent limitations based upon the criteria expressed as dissolved concentrations, then the limitation is established in the permit and the requirements in par. (c) apply.

(c) If, following the procedures in par. (b), effluent limitations are established based upon water quality criteria expressed as dissolved concentrations, then the following shall also be included in the permit:

1. Monitoring requirements which may include, but are not limited to, effluent monitoring, monitoring of effluent toxicity, in-stream monitoring for unfiltered and filtered substances which may be limited in the permit, or other monitoring. Testing methods which allow appropriately sensitive detection limits may also be specified.

2. Conditions which require the permittee to document that reasonable steps have been taken to minimize or eliminate the sources of the substances for which effluent limitations expressed as dissolved concentrations have been established in the permit. The documentation may consist of implementation of a formal pre-treatment program, pollution reduction activities, and other documented efforts which are reasonably likely to reduce or eliminate sources of the substance. The documentation shall be submitted as specified in the permit, unless, prior to issuance of the permit, documented source elimination or reduction efforts have occurred. If reasonable steps have not been taken as specified in the permit, the department may establish effluent limitations based upon a water quality criterion expressed as total recoverable concentrations.

(d) The procedures in pars. (a) to (c) may also be used to establish effluent limits based on aquatic life secondary values.

(8) **CUMULATIVE RISK FOR HUMAN CARCINOGENS.** (a) If an effluent for a particular discharger contains more than one substance for which a human cancer criterion (HCC) exists at levels which warrant water quality based effluent limits, the incremental risk of each carcinogen should be assumed to be additive. Except as provided in par. (b), the water quality based limitation for each carcinogen shall be established in a permit to protect against additive or synergistic effects possibly associated with simultaneous multiple chemical human exposure such that the following condition is met:

$$\frac{C_1}{\text{Limit 1}} + \frac{C_2}{\text{Limit 2}} + \dots + \frac{C_n}{\text{Limit n}} \leq 1$$

Where:

$C_{1...n}$ = the monthly average concentration of each separate carcinogen in the effluent (assumed equal to zero if effluent concentration is not detected).

$\text{Limit}_{1...n}$ = the effluent limitation concentration based on the human cancer criterion for each respective carcinogen.

Note: This additional condition is equivalent to a total incremental risk of cancer due to multiple chemicals not exceeding 10^{-5} .

(b) If information is provided to the department that the carcinogenic risk is not additive, the limitations for each carcinogen will be determined based on that information.

(9) **SEDIMENT DEPOSITION.** The limitations calculated according to the procedures in this section may be reduced to prevent contamination of sediment with toxic substances or to prevent accumulation of the substance in sediments if determined necessary to protect water quality.

(10) **ENVIRONMENTAL FATE.** The limitations calculated pursuant to this section may be modified to account for degradation of the substance based on information available to the department provided that:

(a) The rate of degradation is documented by field studies supplied by the discharger, and

(b) The field studies demonstrate rapid and significant loss of the substance inside the mixing zone under the full range of critical conditions expected to be encountered; and

(c) The field studies are reviewed and approved by the department.

(11) **OTHER METHODS OF CALCULATION.** In lieu of sub. (4), scientifically defensible technical approaches such as calibrated and verified mathematical water quality models developed or adapted for a particular stream, simplified modeling approaches as outlined in "WATER QUALITY ASSESSMENT" (EPA-600/6-82-004), or dynamic methods may be utilized in developing water quality based effluent limitations such that applicable water quality standards specified in chs. NR 102 to 105 are maintained.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; am. (1) (a), (4) (c) 12., (d) 1., (4) (e) 1., (6) (e), cr. (1) (b) 2., (2), (3) (d), (4) (c) 7. to 11., (d) 2., (e) 3., (5) (a) 4., (6) (c) 2., (d), (7), renum. (1) (b), (2) (a) to (c), (3) (a) to (c) 6., 9., (d) 1. and 3., (e) 1. to 6., (4) to (8) to be (8) to (11) and am. (3) (b), (c) (intro.), 4. to 6., (4) (a), (b) (intro.) 1., 2., (c) 4. and 5., (6) (a) to (c), (11) (d) 2., (4) (c) 3., (5) (a) 4., (6) (c) 2. and (d) 5. and (7), r. (2) (d), (3) (c) 7. and 8., (d) 2., (e) 7., Register, August, 1997, No. 500, eff. 9-1-97.

NR 106.07 Application of and compliance with water quality based effluent limitations in permits.

(1) The department shall determine on a case-by-case basis the monitoring frequency to be required for each water quality based effluent limitation in a permit.

(2) A chemical specific water quality based effluent limitation that is established according to this chapter shall be expressed in the permit as both a concentration limitation (in units of mg/L or equivalent units) and a mass limitation (in units of kg/day or equivalent units).

(a) For dischargers subject to ch. NR 210, an acute toxicity based concentration limitation that is derived by the procedure in s. NR 106.06 shall be converted to a mass limitation by using the discharger's maximum effluent flow, expressed as a daily average, that is anticipated to occur for 24 continuous hours during the design life of the treatment facility.

(b) For all other dischargers not subject to ch. NR 210, an acute toxicity based concentration limitation that is derived by the procedures in s. NR 106.06 shall be converted to a mass limitation by using the discharger's maximum effluent flow, expressed as a daily average, that has occurred for 24 continuous hours and represents normal operations. When calculating a mass limitation, the department may consider a projected increase in effluent flow that will occur when production is increased or modified, or another wastewater source, including stormwater, is added to an existing wastewater treatment facility. This paragraph does not waive the requirements of ch. NR 207.

(c) An aquatic life chronic, human health or wildlife-based concentration limitation that is determined by the procedures in s. NR 106.06 shall be converted to a mass limitation by using the same effluent flow rate that was used in s. NR 106.06 (4)(d) to calculate the chronic toxicity concentration limitation. Also, see sub. (9) for alternate wet weather limitations.

(d) A chronic toxicity based mass limitation that is determined by the procedures in s. NR 106.11 shall be converted to a con-

centration limitation by using an effluent flow rate from s. NR 106.06 (4)(d).

Note: The method of allocating the combined allowable load in to s. NR 106.11 does not have to be based on the effluent flow rates specified in s. NR 106.06 (4)(d).

(3) Except as provided in sub. (4), effluent limitations based on acute toxicity criteria or secondary acute values shall be expressed in permits as daily maximum limitations; effluent limitations based on aquatic life chronic toxicity criteria or secondary chronic values shall be expressed in permits as weekly average limitations; and effluent limitations based on wildlife, human threshold or human cancer criteria, or secondary values shall be expressed in permits as monthly average limitations.

(4) If, for a substance, the monitoring frequency determined according to sub. (1) is insufficient to allow calculation of a weekly average, then the water quality based effluent limitation for that substance based on aquatic life chronic toxicity criteria or secondary chronic values may be established in a permit as a daily maximum limitation. If, for a substance, the monitoring frequency determined according to sub. (1) is insufficient to allow calculation of a monthly average, then the water quality based effluent limitation for that substance may be established in a permit as a daily maximum limitation.

(5) If application of sub. (4) results in multiple daily maximum limitations for a substance, the most stringent of the daily maximum, limitations for that substance shall be established in the permit as the limitation.

(6) When the water quality based effluent limitation for any substance in a permit is less than the limit of detection or the limit of quantitation, the following conditions shall apply:

(a) The permittee shall perform monitoring required in the permit using an acceptable analytical methodology for that substance in the effluent which produces the lowest limit of detection and limit of quantitation.

(b) The permittee shall determine the limit of detection and limit of quantitation using a method specified by the department.

(c) Compliance with concentration and mass limitations shall be determined as follows:

1. When the water quality based effluent limitation is less than the limit of detection, effluent levels less than the limit of detection are in compliance with the effluent limitation.

2. When the water quality based effluent limitation is less than the limit of detection, effluent levels greater than the limit of detection, but less than the limit of quantitation are in compliance with the effluent limitation except when analytically confirmed and statistically confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques. The department may require in a permit additional monitoring when effluent levels are between the limit of detection and the limit of quantitation.

3. When the water quality based effluent limitation is greater than the limit of detection, but less than the limit of quantitation effluent levels less than the limit of detection or less than the limit of quantitation are in compliance with the effluent limitation.

(d) When the water quality based effluent limitation is expressed in the permit as a daily maximum or average mass limitation, compliance is determined according to par. (c) after converting the limit of detection and limit of quantitation to mass values using appropriate conversion factors and the actual daily effluent flow, or actual average effluent flow for the averaging period.

(e) Except as provided in this paragraph, when calculating an average or mass discharge level for determining compliance with an effluent limitation according to the provisions of par. (c), a monitoring result less than the limit of detection may be assigned a value of zero. If the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of

detection and if warranted when applying appropriate statistical techniques.

(f) Unless the permittee can demonstrate continuous compliance with the limit, the department shall include a condition in the permit requiring the permittee to develop and implement or update and implement a cost-effective pollutant minimization program as specified in s. NR 106.04(5).

(7) The department may establish a whole effluent toxicity limitation according to s. NR 106.09 as an alternative to a chemical specific water quality-based effluent limitation based on a fish and aquatic life secondary acute or secondary chronic value determined according to ss. NR 105.05(4) and 105.06(6). The alternative whole effluent toxicity limitation shall meet all the following conditions:

(a) The fathead minnow (*Pimephales promelas*) or the cladoceran *Ceriodaphnia dubia* were represented in the toxicological database used to generate the secondary value:

(b) The permittee has requested the alternative whole effluent toxicity limitation; and

(c) Whole effluent toxicity testing required in the permit shall be conducted at a frequency to be determined by the department, but at least once every 3 months during the entire term of the permit.

(8) If the effluent limitation based on a secondary value is established in a permit, the permittee may request that additional time be added to the compliance schedule, according to s. NR 106.17(2), for the permittee to conduct studies, other than studies for site-specific criteria pursuant to s. NR 105.02 (1), that are needed to propose a revision to the secondary value upon which the effluent limitation is based. During this time, the permittee may provide additional data necessary to either refine the secondary value or calculate a water quality criterion.

(9) In addition to the mass limitation calculated under sub. (2)(c), for a discharger subject to ch. NR 210 and which discharges on a year-around basis, the department shall include in the permit an alternative wet weather mass limitation. For purposes of compliance, this alternative wet weather mass limitation shall apply when the mass discharge level exceeds the mass limitation calculated under sub. (2)(c) and when the permittee demonstrates to the satisfaction of the department that the discharge exceedance is caused by and occurs during a wet weather event. For purposes of this subsection, a wet weather event occurs during and immediately following periods of precipitation or snowmelt, including but not limited to rain, sleet, snow, hail or melting snow, during which water from the precipitation, snowmelt or elevated groundwater enters the sewerage system through infiltration or inflow, or both. In calculating this alternative wet weather mass limitation, the department shall use the concentration limit determined by the procedures in s. NR 106.06, the appropriate conversion factor and the appropriate effluent flow given in either par. (a) or (b).

(a) For effluent limitations based on aquatic life chronic toxicity criteria or secondary chronic values, the maximum effluent flow, expressed as a daily average, that is anticipated to occur for 7 continuous days during the design life of the treatment facility.

(b) For effluent limitations based on wildlife, human threshold or human cancer criteria or secondary values, or taste and odor criteria, the maximum effluent flow, expressed as a daily average, that is anticipated to occur for 30 continuous days during the design life of the treatment facility.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; renum. (2) to (5) to be (3) to (6) and am., cr. (2), (6) (d) to (f) and (7) to (9), Register, August, 1997, No. 500, eff. 9-1-97; correction in (7) made under s. 13.93 (2m) (b) 1., Stats., Register, October, 1999, No. 526.

NR 106.08 Determination of the necessity for whole effluent toxicity testing requirements and limitations.

(1) GENERAL. The department shall establish whole effluent toxicity testing requirements and limitations whenever necessary to meet applicable water quality standards as specified in chs. NR

102 to 105 as measured by exposure of aquatic organisms to an effluent and specified effluent dilutions. When considering the necessity for whole effluent toxicity testing requirements and limitations, the department shall consider in-stream biosurvey data and data from ambient toxicity analyses, whenever such data are available.

(2) **DETERMINATION OF NECESSITY.** If representative discharge data are available for an effluent being discharged from a point source, whole effluent toxicity testing requirements are necessary when:

(a) Existing aquatic life toxicity test data generated according to standard test protocols indicate a potential for an effluent from a point source discharge to adversely impact the receiving water aquatic life community.

(b) A water quality based effluent limitation for a toxic substance is determined necessary in s. NR 106.05.

(3) **NO REPRESENTATIVE DATA.** If no representative discharge data are available for an effluent being discharged from a point source, whole effluent toxicity testing requirements are necessary if, in the judgment of the department, water quality standards may be exceeded. In such cases, the following factors shall be considered.

(a) Any relevant information which is available that indicates a potential for an effluent to impact the receiving water aquatic life community.

(b) Available dilution in the receiving water.

(c) Discharge category and predicted effluent quality.

(d) Proximity to other point source dischargers.

(4) **OTHER CONSIDERATIONS.** Regardless of the results of the analysis conducted under this section, the department may, whenever determined necessary, require whole effluent toxicity testing for a point source discharge. The department may use information submitted under s. 166.20 (5) (a) 3. and 4., Stats., together with other information, in determining when whole effluent toxicity testing is necessary.

(5) **REASONABLE POTENTIAL TO RECEIVE AN ACUTE OR CHRONIC WHOLE EFFLUENT TOXICITY LIMIT.** (a) *General.* Whole effluent toxicity limits are established in a permit according to s. NR 106.09 whenever representative, facility-specific whole effluent toxicity data demonstrate that the effluent is or may be discharged at a level that will cause, have the potential to cause, or contribute to an excursion of a water quality standard. In evaluating the potential of a water quality standard to be exceeded, a reasonable potential factor (RPF) shall be calculated for a discharger with 5 or more representative toxicity tests according to par. (b). Whole effluent toxicity limits shall be imposed in a WPDES permit whenever the RPF calculated according to par. (b) exceeds 0.3. Whole effluent toxicity limits may be imposed, on a case-by-case basis, whenever facility-specific whole effluent toxicity test data indicate toxicity to aquatic life as determined in s. NR 106.09. Whole effluent toxicity limits may also be imposed in the absence of facility-specific whole effluent toxicity test data, on a case-by-case basis, whenever facility-specific or site-specific data or conditions indicate toxicity to aquatic life that is attributable to the discharger.

(b) *Reasonable potential factor.* The percentage of failures and the severity of those failures for the most sensitive species shall be used to determine when a whole effluent toxicity limit is established in a permit.

1. When a zone of initial dilution has not been approved by the department, a RPF for acute toxicity shall be calculated as follows for toxicity test data with a calculated LC₅₀:

$$RPF = \text{Geometric Mean } TU_a \times \text{Failure Rate}$$

Where: Failure Rate = (Representative Tests Failed/ Representative Tests Conducted)

2. When a zone of initial dilution has not been approved by the department, a RPF for acute toxicity shall be calculated as follows for toxicity test data without a calculated LC₅₀:

$$RPF = \text{Geometric Mean } S \times \text{Failure Rate}$$

Where: $S = (50 \div X)^{1/2}$

Where: X = 50 if the percent survival in 100% effluent is greater than or equal to 50%,
X = 5 if the percent survival in 100% effluent is less than or equal to 5%,
X = the percent survival in 100% effluent when the percent survival is less than 50% and greater than 5%.

$$\text{Failure Rate} = (\text{Representative Tests Failed} / \text{Representative Tests Conducted})$$

3. When a zone of initial dilution has been approved by the department, according to s. NR 106.06(3)(c), a RPF for acute toxicity shall be calculated as follows:

$$RPF = \text{Failure Rate}$$

Where: Failure Rate = (Representative Tests Failed/ Representative Tests Conducted)

4. The RPF for chronic toxicity shall be calculated as follows:

$$RPF = \text{Geometric Mean of } rTU_c \text{ values} \times \text{Failure Rate}$$

Where: $rTU_c = IWC/IC_{25}$

If an IC₂₅ is not available for a given toxicity test, a NOEC value may be used.

$$\text{Failure Rate} = (\text{Representative Tests Failed} / \text{Representative Tests Conducted})$$

(c) *Representative data.* Toxicity test data available to the department shall be considered representative when those data meet the following conditions:

1. Data are representative of normal discharge conditions;
2. Data were produced by a lab certified or registered under ch. NR 149;
3. Data were produced from toxicity test procedures specified in the WPDES permit;
4. Data were produced from toxicity tests that met all applicable quality assurance/quality control requirements specified in the WPDES permit; and
5. Data represent the geometric mean of all whole effluent toxicity test failures for the most sensitive species.

(d) *Use of other data when determining reasonable potential.* Data from toxicity tests not required in a WPDES permit and other empirical data may be considered when making judgments regarding reasonable potential. This may include data from split samples, toxicity testing evaluations, screening tests, single species tests and other information.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; am. (1), r. and rec. (5), Register, August, 1997, No. 500, eff. 9-1-97.

NR 106.09 Whole effluent toxicity data evaluation and limitations. (1) **DATA EVALUATION.** Data evaluation procedures are specified in the "State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 1st Edition", Wisconsin Department of Natural Resources, 1996. The "Aquatic Life Testing Methods Manual, 1st Edition" (1996) is incorporated by reference. In the event of a WET test failure, facility specific requirements shall be

established in the WPDES permit which specify required follow-up actions.

Note: This publication is available at the office of the department of natural resources, the secretary of state and the revisor of statutes. Copies are available from the Department of Natural Resources, Bureau of Integrated Science Services, P.O. Box 7921, Madison, WI 53707

(2) ACUTE WHOLE EFFLUENT TOXICITY. (a) Except as provided in par. (c), the department shall establish acute whole effluent toxicity limitations to ensure that substances shall not be present in amounts which are acutely harmful to aquatic life in all surface waters including the mixing zone and effluent channel as required by s. NR 102.04(1).

(b) To assure compliance with par. (a), a whole effluent toxicity test, may not produce a statistically valid LC₅₀ less than 100% with the following taxa-specific exposure periods:

1. 48 hours for aquatic invertebrate organisms (including *Ceriodaphnia dubia*);
2. 96 hours for aquatic vertebrate organisms (including fathead minnows (*Pimephales promelas*));
3. Any other exposure period deemed appropriate by the department for a specific test organism.

(c) If a zone of initial dilution is determined appropriate in accordance with the provisions of s. NR 106.06(3)(c), whole effluent acute toxicity limitations determined by this subsection shall be adjusted such that the effluent meets the following condition. The adjustment shall insure that after dilution of the effluent with the receiving water at a concentration equal to 3.3 times the percent dilution value calculated through application of the zone of initial dilution, the test solution of effluent and receiving water shall not produce a statistically valid LC₅₀ less than 3.3 times the percent dilution value determined through application of the zone of initial dilution with the exposure periods as provided in par. (b).

(d) If, in the judgment of the department, the statistical interpretation methods used to test for LC₅₀ are not appropriate for a specific data set, empirical interpretation methods may be used to determine the significance of an effect.

(e) Compliance with an acute whole effluent toxicity water quality based limitation shall be determined as follows:

1. For dischargers without an approved zone of initial dilution, a TU_a of 1.0 may not be exceeded.
2. For dischargers with an approved zone of initial dilution determined according to s. NR 106.06(3)(c), a TU_a of X may not be exceeded.

Where: $X = 100 \div (3.3 \times \text{Dilution Factor})$

Dilution Factor = $\frac{\text{The Approved Zone of Initial Dilution Concentration}}{\text{Initial Dilution Concentration}}$

(3) CHRONIC WHOLE EFFLUENT TOXICITY. (a) The department shall establish chronic whole effluent toxicity limitations to ensure that concentrations of substances that are not discharged from a point source that alone or in combination with other materials present are toxic to fish or other aquatic life as required by s. NR 102.04 (4) (d).

(b) To assure compliance with par. (a), an effluent, after dilution with an appropriate allowable quantity of receiving water flow equivalent to that provided by receiving water flows specified in s. NR 106.06 (4) (c) or implied in s. NR 106.06 (4) (b) 2., may not cause a significant adverse effect, as determined by subs. 1. and 2., to a test organism population when compared to an appropriate control.

1. Using statistical interpretation methods appropriate to the toxicity test protocol, an adverse effect will be determined to be significant if the statistically derived IC₂₅, from the whole effluent toxicity test, is less than the calculated IWC.

2. If, in the judgment of the department, the statistical interpretation methods used to test for significance are not appropriate

for a specific data set, empirical interpretation methods may be used to determine the significance of an effect.

(c) Compliance with a chronic whole effluent toxicity water quality based limitation shall be determined as a calculated rTU_c less than or equal to 1.0.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; renun. (1) (a), (b), (c) (intro.) and 2. and (2) to be (2) (a) to (c) and (3) and am. (2) (b), (c), (3) (a), (b) (intro.) and 1., r. (1) (c) 1., cr. (1), Register, August, 1997, No. 500, eff. 9-1-96.

NR 106.10 Exclusions. (1) NONCONTACT COOLING WATER. Except as provided in sub. (2), the department may not impose water quality based effluent limitations for toxic and organoleptic substances for discharges of uncontaminated stormwater runoff not defined as point sources by s. 283.01 (12), Stats., non-contact cooling waters which do not contain additives or combined discharges consisting solely of uncontaminated stormwater runoff and noncontact cooling water without additives. Only the additives to noncontact cooling waters shall be examined under this chapter for the establishment of water quality based effluent limitations. For purposes of this exclusion, the term "additives" are those compounds intentionally introduced by the discharger, but do not include the addition of compounds at a rate and quantity necessary to provide a safe drinking water supply, or the addition of substances in similar type and amount to those substances typically added to a public drinking water supply. The following may be used to establish water quality based effluent limitations for noncontact cooling waters:

(a) If at least one 48-hour LC₅₀ or EC₅₀ value is available for *Daphnia magna* or *Ceriodaphnia dubia* and at least one 96-hour LC₅₀ or EC₅₀ value is available for either fathead minnow, rainbow trout or bluegill, the geometric mean LC₅₀ or EC₅₀ for each of these species shall be divided by 5 if rainbow trout are represented in the data base or divided by 10 if rainbow trout are not represented in the data base. The limitation for purposes of this section shall be equal to the lowest resultant value. A limitation can be calculated for an additive only if both LC₅₀ and EC₅₀ data for at least one of the invertebrate species and at least one of the fish species listed above are available.

(b) Effluent limitations based on chronic toxicity to aquatic life shall be established using the procedures described in this paragraph for additives whenever chronic toxicity criteria are not available from s. NR 105.06. The calculation of limitations shall be in accordance with the requirements of s. NR 106.06 (4) (b). In this calculation, the water quality criterion concentration shall be equal to the final acute value for that additive as provided in s. NR 105.05, or the effluent limitation as determined in par. (a), divided by the geometric mean of all the vertebrate and invertebrate species mean acute-chronic ratios determined in accordance with s. NR 105.06 (5) for that additive. A water quality criterion concentration may be calculated for an additive only if a final acute value, as provided in s. NR 105.05 or an effluent limitation as determined in par. (a), and an acute-chronic ratio for a vertebrate species and an acute-chronic ratio for an invertebrate species are available.

(c) Groundwater which is withdrawn from a location because of noncompliance with the standards contained in ch. NR 140 and which is used as noncontact cooling water shall not be subject to this exclusion.

(d) Regardless of the results of the analysis conducted under this section, the department may, whenever determined necessary, require whole effluent toxicity testing for a point source discharge.

(2) INTERMITTENT DISCHARGES. Effluent limitations derived as specified in s. NR 106.06 (3) and (4) for substances which rapidly degrade and which are discharged for less than 24 hours per day shall be calculated as specified in those subsections, unless the discharger demonstrates to the department that, as a result of the

duration and frequency of the discharge, adverse effects will not occur when limitations are increased.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; am. (1) (a), (b) and (2), cr. (1) (d), August, 1997, No. 500, eff. 9-1-97.

NR 106.11 Multiple discharges. Whenever the department determines that more than one discharge may be affecting the water quality of the same receiving water for one or more substances, the provisions of this chapter shall be used to calculate the combined allowable load from the discharges necessary to meet the water quality criteria for the substances. The resultant combined allowable load shall be divided among the various discharges using an allocation method based on site-specific considerations. Whenever the department makes a determination under this section, the department shall notify all permittees who may be affecting the water quality of the same receiving water of the determination and any limitations developed under this section. Permittees shall be given the opportunity to comment to the department on any determination made under this section.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; am. Register, August, 1997, No. 500, eff. 9-1-97.

NR 106.12 Limitations for ammonia nitrogen. Regardless of any other requirement of this chapter, the department shall establish, on a case-by-case basis, water quality based effluent limitations for discharges of ammonia nitrogen. The criteria and limitations established in s. NR 104.02(3)(a) 2. b. and 3. a. for discharges to surface waters not supporting a balanced aquatic community shall apply.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89.

NR 106.13 Leachate in publicly owned treatment works. Publicly owned treatment works subject to ch. NR 210 may demonstrate to the department that leachate from a licensed solid waste facility materially affects the quality of effluent from that treatment works and affects the capability of the treatment works to meet the effluent limitations established under this chapter. If the department determines that a proper demonstration has been made, the department shall, within its capabilities, provide reasonable assistance to the owner of the treatment works and establish an appropriate schedule of compliance.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89.

NR 106.14 Analytical methods and laboratory requirements. (1) Methods used for analysis of samples shall be those specified in ch. NR 219 unless alternative methods are specified in the WPDES discharge permits. Where more than one approved analytical method for a pollutant exists, the department may specify in the permit which method shall be used.

(2) The permittee shall submit, with all monitoring results, appropriate quality control information, as specified by the department.

(3) The permittee shall report numerical values for all monitoring results greater than the limit of detection, as determined by a method specified by the department, unless analyte-specific instructions in the WPDES permit specify otherwise. The permittee shall appropriately identify all results greater than the limit of detection but less than the limit of quantitation.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; renum. NR 106.14 to be (1), cr. (2) and (3), Register, August, 1997, No. 500, eff. 9-1-97.

NR 106.15 Limitations for mercury. Regardless of the effluent limitations determined under this chapter, the discharge of organic mercury compounds, inorganic mercury compounds, and metallic mercury shall not exceed the requirements in s. 281.17 (7), Stats., and ch. NR 100.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89.

NR 106.16 Additivity of dioxins and furans. The 2,3,7,8-TCDD toxicity equivalence concentration in effluent shall be used when developing waste load allocations and for purposes of establishing water quality based effluent limits.

(1) For the chlorinated dibenzo-p-dioxins (CDDs) listed in Tables 7, 8 and 9 in ch. NR 105, the potential adverse additive effects of all dioxin (CDD) and chlorinated dibenzofuran (CDF) congeners in effluents shall be accounted for as specified in this section.

(2) The Toxicity Equivalency Factors (TEFs) in Table 1 and Bioaccumulation Equivalency Factors (BEFs) in Table 2 shall be used when calculating a 2,3,7,8-TCDD toxicity equivalence concentration in effluent to be used when implementing both human health noncancer and cancer criteria. The chemical concentration of each CDD and CDF in effluent shall be converted to a 2,3,7,8-TCDD toxicity equivalence concentration in effluent by using the following equation:

$$(TEC)_{TCDD} = \sum (C)_x (TEF)_x (BEF)_x$$

where:

$(TEC)_{TCDD}$ = 2,3,7,8-TCDD toxicity equivalence concentration in effluent

$(C)_x$ = concentration of total chemical x in effluent

$(TEF)_x$ = TCDD toxicity equivalency factor for x from table 1

$(BEF)_x$ = TCDD bioaccumulation equivalency factor for x from table 2

Table 1

Toxicity Equivalency Factors for CDDs and CDFs

Congener	TEF
2,3,7,8-TCDD	1.0
1,2,3,7,8-PeCDD	0.5
1,2,3,4,7,8-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
OCDD	0.001
2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDF	0.05
2,3,4,7,8-PeCDF	0.5
1,2,3,4,7,8-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
OCDF	0.001

Table 2

Bioaccumulation Equivalency Factors for CDDs and CDFs

Congener	BEF
2,3,7,8-TCDD	1.0
1,2,3,7,8-PeCDD	0.9
1,2,3,4,7,8-HxCDD	0.3
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.05
OCDD	0.01

2,3,7,8-TCDF	0.8
1,2,3,7,8-PeCDF	0.2
2,3,4,7,8-PeCDF	1.6
1,2,3,4,7,8-HxCDF	0.08
1,2,3,6,7,8-HxCDF	0.2
2,3,4,6,7,8-HxCDF	0.7
1,2,3,7,8,9-HxCDF	0.6
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.4
OCDF	0.02

History: Cr., Register, August, 1997, No. 500, eff. 9-1-97.

NR 106.17 Schedules for compliance. (1) Any point source which has not received a WPDES permit from the department prior to March 23, 1997 or which commenced construction after that date may not receive a schedule for compliance to meet an effluent limitation that is established under the provisions of this chapter. The department may allow a brief period, not to exceed 90 days from the beginning of discharge, for the discharger to correct pollution control equipment start-up problems.

(2) A reissued or modified permit may include a schedule for compliance with new or more stringent effluent limitations that

are established by this chapter. The schedule for compliance shall meet the following conditions:

- (a) Be as short as reasonably possible;
- (b) May not extend beyond 5 years from the date that the permit is reissued or modified to include the new or more stringent effluent limitation, except as provided in par. (c);
- (c) If the effluent limitation is based on a secondary value, the compliance schedule may allow the permittee additional time to conduct studies, other than those for site-specific criteria developed under s. NR 105.02 (1), that are needed to propose a revision to the secondary value upon which the effluent limitation is based. In no case may the compliance schedule for an effluent limitation that is based on a secondary value extend beyond 7 years from the date that the permit is reissued or modified to include the effluent limitation;
- (d) May not allow more than one year between interim compliance dates;
- (e) May require the permittee to evaluate pollution and waste minimization measures as a means for complying with the effluent limitation; and
- (f) May extend beyond the expiration date of the permit if an interim permit limit which is effective upon the permit's expiration date is included in the permit.

Note: An interim permit limit is not necessarily a numerical effluent limitation.
History: Cr., Register, August, 1997, No. 500, eff. 9-1-97.