

**NACWA White Paper:
Whole Effluent Toxicity Permit
Testing and Limitations
For Clean Water Agencies**

Appendix D

REGION 4

LIMITS

D. BIOMONITORING REQUIREMENTS, CHRONIC

The permittee shall conduct a 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test and a 7-Day Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test on samples of final effluent from Outfall 001.

The measured endpoint for toxicity will be the inhibition concentration causing 25% reduction in survival, reproduction and growth (IC_{25}) of the test organisms. The IC_{25} shall be determined based on a 25% reduction as compared to the controls, and as derived from linear interpolation. The average reproduction and growth responses will be determined based on the number of *Ceriodaphnia dubia* or *Pimephales promelas* larvae used to initiate the test.

Test shall be conducted and its results reported based on appropriate replicates of a total of five serial dilutions and a control, using the percent effluent dilutions as presented in the following table:

Serial Dilutions for Whole Effluent Toxicity (WET) Testing					
4 X PL	2 X PL	Permit Limit (PL)	0.50 X PL	0.25 X PL	Control
% effluent					
40	20	10	5	2.5	0

The dilution/control water used will be moderately hard water as described in Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013 (or the most current edition). A chronic standard reference toxicant quality assurance test shall be conducted with each species used in the toxicity tests and the results submitted with the discharge monitoring report. Additionally, the analysis of this multi-concentration test shall include review of the concentration-response relationship to ensure that calculated test results are interpreted appropriately.

Toxicity will be demonstrated if the IC_{25} is less than or equal to the permit limit indicated for each outfall in the above table(s). Toxicity demonstrated by the tests specified herein constitutes a violation of this permit.

All tests will be conducted using a minimum of three 24-hour flow-proportionate composite samples of final effluent collected on days 1, 3 and 5. If, in any control more than 20% of the test organisms die in 7 days, the test (control and effluent) is considered invalid and the test shall be repeated within two (2) weeks. Furthermore, if the results do not meet the acceptability criteria in Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013 (or the most current edition), or if the required concentration-response review fails to yield a valid relationship per guidance contained in Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing, EPA-821-B-00-004 (or the most current edition), that test shall be repeated. Any test initiated but terminated before completion must also be reported along with a complete explanation for the termination.

The toxicity tests specified herein shall be conducted quarterly (1/Quarter) for Outfall 001 and begin no later than 90 days from the effective date of this permit.

In the event of a test failure, the permittee must start a follow-up test within 2 weeks and submit results from a follow-up test within 30 days from obtaining initial WET testing results. The follow-up test must be conducted using the same serial dilutions as presented in the corresponding table(s) above. The follow-up test will not negate an initial failed test. In addition, the failure of a follow-up test will constitute a separate permit violation.

In the event of 2 consecutive test failures or 3 test failures within a 12-month period for the same outfall, the permittee must initiate a Toxicity Identification Evaluation/Toxicity

Reduction Evaluation (TIE/TRE) study within 30 days and so notify the Division by letter. This notification shall include a schedule of activities for the initial investigation of that outfall. During the term of the TIE/TRE study, the frequency of biomonitoring shall be once every three months. Additionally, the permittee shall submit progress reports once every three months throughout the term of the TIE/TRE study. The toxicity must be reduced to allowable limits for that outfall within 2 years of initiation of the TIE/TRE study. Subsequent to the results obtained from the TIE/TRE studies, the permittee may request an extension of the TIE/TRE study period if necessary to conduct further analyses. The final determination of any extension period will be made at the discretion of the Division.

The TIE/TRE study may be terminated at any time upon the completion and submission of 2 consecutive tests (for the same outfall) demonstrating compliance. Following the completion of TIE/TRE study, the frequency of monitoring will return to a regular schedule, as defined previously in this section as well in Part I of the permit. During the course of the TIE/TRE study, the permittee will continue to conduct toxicity testing of the outfall being investigated at the frequency of once every three months but will not be required to perform follow-up tests for that outfall during the period of TIE/TRE study.

Test procedures, quality assurance practices, determinations of effluent survival/reproduction and survival/growth values, and report formats will be made in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Results of all tests, reference toxicant information, copies of raw data sheets, statistical analysis and chemical analyses shall be compiled in a report. The report will be written in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Two copies of biomonitoring reports (including follow-up reports) shall be submitted to the Division. One copy of the report shall be submitted along with the discharge monitoring report (DMR). The second copy shall be submitted to the local Division of Water Pollution Control office address (see table below):

Division of Water Pollution Control			
Office	Location	Zip Code	Phone No.
Chattanooga	540 McCallie Avenue, Suite 550	37402-2013	(423) 634-5745
Jackson	362 Carriage House Drive	38305-2222	(731) 512-1300
Cookeville	1221 South Willow Avenue	38506	(931) 432-4015
Columbia	2484 Park Plus Drive	38401	(931) 380-3371
Johnson City	2305 Silverdale Road	37601	(423) 854-5400
Knoxville	2700 Middlebrook Pike, Suite 220	37921	(865) 594-6035
Memphis	2510 Mt. Moriah Road, Suite E-645	38115-1511	(901) 368-7939
Nashville	711 R.S. Gass Boulevard	37243-1550	(615) 687-7000

REGION 5

LIMITS
(Ohio regulatory RP procedure)

3745-33-07 Establishing permit conditions.

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(B) Establishing final limitations for whole effluent toxicity.

(1) The director shall evaluate whole effluent toxicity for a discharge using available data on the factors listed in paragraphs (B)(1)(a) to (B)(1)(d) of this rule and the evaluation matrix in table 1 of this rule to determine whether the discharge has the reasonable potential to cause or contribute to violations of water quality standards contained in Chapter 3745-1 of the Administrative Code. The director shall classify the toxicity hazard of the discharge in one of the four categories listed in table 1 of this rule.

(a) The magnitude, frequency and variability of toxicity discharged;

(b) The degree and type of near-field and far-field effects in the receiving water as measured by physical, chemical, toxicity or biological index measurements;

(c) The quality and quantity of each type of data available; and

(d) Other relevant factors.

(2) When the director determines that the discharge has the reasonable potential to cause or contribute to an exceedance of the water quality standards contained in paragraph (D) of rule 3745-1-04 of the Administrative Code, the discharger shall be classified in hazard category 1 of table 1 of this rule, and the permit shall contain a discharge limitation for toxicity as determined using the procedures in rule 3745-2-09 of the Administrative Code, and any applicable procedures in paragraphs (B)(5) to (B)(10) of this rule.

(3) For dischargers classified in hazard category 2, the director shall require monitoring with a permit limit for WET that is triggered by events specified in the permit. As an alternative to limits, the director may require the permittee to conduct a plant performance evaluation (PPE). A PPE contains an evaluation of processes, inputs and treatment including but not limited to toxicity pass-through at the treatment plant, chemicals used in the treatment process, and the effect of plant processes or industrial users on WET discharged by the treatment plant.

(4) When the evaluation from paragraph (B)(1) of this rule using factors in paragraphs (B)(1)(a) to (B)(1)(d) of this rule indicates that monitoring is necessary for dischargers classified in hazard category 3 of table 1 of this rule, the permit shall contain a monitoring requirement.

(5) Limits for acute toxicity of 1.0 TUa that are based on protecting the inside-mixing-zone water quality standard in paragraph (D) of rule 3745-1-04 of the Administrative Code may be modified if the discharger demonstrates attainment of this water quality standard using one of the following methods:

(a) An AIM study approved under rule 3745-2-08 of the Administrative Code; or

(b) A correlation of effluent and near-field toxicity data for the discharge that indicates that the narrative water quality standard is being attained; or

(c) Biological index measurements taken within the area defined in paragraph (I)(1) of rule 3745-2-08 of the Administrative Code that indicate the absence of toxic conditions.

(6) Demonstrations conducted under paragraphs (B)(5)(b) or (B)(5)(c) of this rule shall meet the requirements of paragraphs (C)(4) to (C)(7) and (C)(9) to (C)(13) of rule 3745-2-08 of the Administrative Code. In addition, the director may modify maximum limitations that are approved under paragraph (B)(5)(b) or (B)(5)(c) of this rule using the

results of an AIM computer modeling or field study performed in accordance with rule 3745-2-08 of the Administrative Code.

(7) The director shall review demonstrations under paragraphs (B)(5) and (B)(6) of this rule using the factors in paragraphs (B)(1)(a) to (B)(1)(d) of this rule to ensure that uses are not impaired by toxicity before approving modified limitations for whole effluent toxicity.

(8) The director may modify limitations for acute or chronic toxicity that are based on protecting the water quality standard in paragraph (D) of rule 3745-1-04 of the Administrative Code if the discharger reduces effluent toxicity by a substantial amount after the issuance of the effluent limit, and if subsequent biological index measurements indicate the absence of toxic conditions downstream of the discharge or mixing zone, as appropriate.

(9) The director may modify limitations for acute toxicity for discharges to water bodies designated limited resource water under Chapter 3745-1 of the Administrative Code if the discharger demonstrates that severe habitat degradation prevents the presence of biological communities typically associated with this water body use.

(10) For the purposes of establishing whole effluent toxicity limitations, the values of 1.0 T_{ua} and 1.0 T_{Uc} shall be the most restrictive limitations applied in permits. If the ratio of stream design flow to effluent flow is less than 3.3 to 1.0, the director may require special measures to investigate and remediate acute toxicity when an effluent consistently exhibits thirty per cent to fifty per cent mortality in one hundred per cent effluent.

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Table 1. Criteria for potential environmental hazard categories

Attribute Evaluated	Category/Degree of Toxicity Problem			
	1 Adequately Documented	2 Strongly Suspected	3 Possible	4 None
(A) Effluent toxicity				
• Minimum number of tests (Actual number)	3	1	0-1	0-1
• Per cent of tests > WLA (Actual per cent)	> 30	20-30	10-20	< 10
• Effluent geometric mean TU TUa () TUc ()				
• Average exceedance ¹				
- Without paragraph (B) and/or (C) of this table available				
Acute ²	> 0.3	≥ 0.3	≥ 0.2	< 0.2
Chronic	> 0.3 x WLA	≥ 0.3 x WLA	≥ 0.2 x WLA	< 0.2 x WLA
- With paragraph (B) and/or (C) of this table available				
Acute ²	> 0.5	≥ 0.3	≥ 0.3	< 0.3
Chronic	> 0.67 x WLA	≥ 0.5 x WLA	≥ 0.5 x WLA	< 0.5 x WLA
• Maximum TU value				
- Without paragraph (B) and/or (C) of this table available	≥ 3 x WLA	≥ 1 x WLA	≥ 1 x WLA	< 1 x WLA
- With paragraph (B) and/or (C) of this table available and confirming toxic impact	> 1 x WLA	≥ 1 x WLA	≥ 0.5 x WLA	< 0.5 x WLA
(B) Near-field impact				
• Mortality within mixing zone ³	≥ 20%	≤ 20%	≤ 20%	< 20%
• Stream community impact within mixing zone				
- Implied chemically ⁴	≥ 3 x IMZM	≥ 1.5 x IMZM	≥ IMZM	≤ 0.5 x IMZM
- Implied toxicologically ⁴	≥ 1.0 TUa	≥ 1.0 TUa	≥ 1.0 TUa	< 1.0 TUa
- Measured biologically	Toxic or severe unknown signature	Fair/poor community	Slight impact or unknown impact signature	None or non-toxic signature
(C) Far-field impact				
• Aquatic life use impairment (Ohio EPA biological criteria)	Yes ⁵	Yes or partial ⁵	Partial	None or non-toxic signature
• Stream community impact	Significant effect	Significant effect	Unknown or slight effect	None
- Implied toxicologically ³				
• Other indicators	Stress indicated	Stress indicated	Stress indicated	No stress

¹ Compare (per cent exceedances x geometric mean TU) to table factor.² Use 0.3 x WLA for situations where AIM exists.³ Results of ambient toxicity test are not binding or required for classification as to category, but if available, will be interpreted under the weight of evidence principle giving due consideration as to sampling location and conditions.⁴ Based on effluent data. May not be appropriate for situations where AIM exists.⁵ Lack of attainment due to toxic, complex or unidentifiable type of impact.

REGION 9

LIMITS

1. Whole Effluent Acute Toxicity

Representative samples of the discharge at Outfall E-001 shall meet the following limitations for acute toxicity. Bioassays shall be conducted in compliance with Provision E.8.

a. The survival of bioassay test organisms in 96-hour bioassays of undiluted effluent shall be: (1) An eleven (11)-sample median value of not less than 90 percent survival...
