

STATE OF SOUTH DAKOTA
DEPARTMENT OF
AGRICULTURE & NATURAL RESOURCES

South Dakota
WET Implementation Plan

GUIDANCE DOCUMENT FOR
WHOLE EFFLUENT TOXICITY (WET)

SURFACE WATER QUALITY PROGRAM

December 20, 2021

FOREWARD/DISCLAIMER

This document outlines the procedures to be used by the Surface Water Quality Program staff and by permittees for the implementation of whole effluent toxicity (WET) control. South Dakota has been granted delegation to run the National Pollutant Discharge Elimination System (NPDES) program. WET testing is a component of this program and is used in Surface Water Discharge (SWD) permits to be protective of South Dakota's water quality standards.

This document addresses both permitting and enforcement aspects of South Dakota Department of Agriculture & Natural Resources (Department) WET program. It is intended to assist permit writers in developing logical and consistent permits and to serve as an administrative guide towards reasonable and appropriate enforcement.

TABLE OF CONTENTS

FOREWARD/DISCLAIMER.....1

TABLE OF CONTENTS2

DEFINITIONS3

INTRODUCTION AND BACKGROUND6

PERMITTING GUIDANCE.....7

 Basic Permitting Principles for Whole Effluent Toxicity.....7

 General Permitting Implementation Guidance.....8

 Additional Numerical Limits.....9

 Acute vs. Chronic Determination.....9

 WET Testing Methods10

 Altering of Test Methods11

 Invalid WET Samples or Tests.....12

 Holding Times.....12

 Dilution Series.....13

 Dilution Water Water14

 Sample Collection Method/Type.....15

 Monitoring and Sampling Frequency.....16

 Reduced Monitoring.....16

 Species and Test Method Selection.....17

 Acute and Chronic Criteria (Narrative WET Criteria).....17

 Acute and Chronic WET Limits.....18

 Toxicity Units (TUs) Conversion.....20

 WET Test Reporting21

 WET Test Result Evaluations21

 Pattern of Toxicity.....21

 Preliminary Toxicity Investigations (PTI).....22

 Accelerated Testing.....22

 Toxicity Identification Evaluations (TIE) and Toxicity Reduction Evaluations (TRE).....23

ENFORCEMENT GUIDANCE24

REFERENCES.....25

APPENDICES

 A - Suggested Standard SOB & Permit Language

 B - Acute and Chronic Test Reporting Forms

 C - List of Figures

 1 - WET Application Flow Chart

 2 - Acute vs. Chronic Flow Chart

 3 - WET Limit Violation/Failure Flow Chart

 D - ICIS & DATABASE Coding

 E – Frequently Asked Questions (FAQ’s)

DEFINITIONS

Acute Toxicity Test is a short-term test to determine the concentration of effluent or ambient waters that causes an adverse effect (usually mortality) on a group of test species during a short-term exposure (e.g., 24, 48, or 96 hours).

ARSD means Administrative Rules of South Dakota. These are often referred to as “Standards.”

Chronic Toxicity Test is a short-term test, usually 96 hours or longer in duration, in which sub-lethal effects (e.g., significantly reduced growth, reproduction, disorientation, immobilization) are usually measured in addition to lethality.

Composite Sample (24-Hour) shall be flow proportioned. The composite sample shall contain at least four samples collected over the compositing period. Unless otherwise specified, the time between the collection of the first sample and the last sample shall not be less than six hours nor more than 24 hours. Acceptable methods for preparation of composite samples are as follows:

1. Constant time interval between samples, sample volume proportional to flow rate at time of sampling,
2. Constant time interval between samples, sample volume proportional to total flow (volume) since last sample. For the first sample, the flow rate at the time the sample was collected may be used,
3. Constant sample volume, time interval between samples proportional to flow (i.e., sample taken every “X” gallons of flow); and,
4. Continuous collection of sample, with sample collection rate proportional to flow rate.

Discharge Monitoring Report (DMR) means Discharge Monitoring Report, EPA Form 3320-1, or a report filed electronically by an EPA-approved electronic system, or other forms provided by the Department which are used to report sampling data.

Grab Sample for monitoring requirements is a single “dip and take” sample collected at a representative point in the discharge stream.

Inhibition Concentration, 25 Percent (IC₂₅) is a point estimate of the toxicant concentration that would cause a 25-percent reduction in a biological measurement (e.g., reproduction, growth), calculated from a continuous model (i.e., Interpolation Method).

Instream Waste Concentration (IWC) is the concentration of a toxicant in the receiving water after mixing. It is also referred to as the receiving water concentration (RWC).

Lethal Concentration, 50 Percent (LC₅₀) is the toxic or effluent concentration that would cause mortality in 50 percent of the test organisms over a specified period of time.

Mixing Zone (Zone of mixing) is an area in a stream where an effluent or discharge mixes with the upstream water under ARSD 74:51:01:01. A mixing zone for wastewater discharges to flowing waters is allowed under ARSD 74:51:01:26. Lakes are not allowed a mixing zone under ARSD 74:51:01:27.

National Pollutant Discharge Elimination System (NPDES) is the EPA program that regulates discharges to the nation's waters. Discharge permits issued under the NPDES program are required by EPA regulation to contain, where necessary, effluent limits based on water quality criteria for the protection of aquatic life and human health. South Dakota has been delegated to implement this permitting program, which is called the South Dakota Surface Water Discharge (SWD) permitting program.

No Observed Effect Concentration (NOEC) is the highest tested concentration of an effluent or a toxicant that causes no observable adverse effect on the test species (i.e., the highest concentration of toxicant at which the values for the observed responses are not statistically different from the controls). Determined using hypothesis testing.

Preliminary Toxicity Investigation (PTI) is up to a 30-day period where the permittee investigates the cause(s) of a whole effluent toxicity exceedance and if the toxicity is known, includes a proposal for its elimination.

Publicly Owned Treatment Works (POTWs) is any device or system used in a treatment, including recycling and reclamation, of municipal sewage or industrial waste of a liquid nature which is owned by the state or a municipality. This term includes sewers, pipes, or other conveyances only if they convey wastewater to a publicly owned treatment works providing treatment.

Reasonable Potential (RP) is the likelihood that an effluent will cause or contribute to an excursion above a water quality standard based on a number of factors, including the use of data (e.g., whole effluent toxicity test data). In the context of this document, references to RP and WET limits include both lethal and sub-lethal effects.

Reference Toxicant Test (Control) is a check of the sensitivity of the test organisms and the suitability of the test methodology in a toxicity test. Reference toxicant data are part of a routine QA/QC program to evaluate the performance of laboratory personnel and the robustness and sensitivity of the test organisms.

Surface Water Discharge (SWD) Permitting Program is the state program that regulates the discharge of pollutants into the state's waters. This is the state's implementation of the federal NPDES program.

Test Acceptability Criteria (TAC) are specific criteria for determining whether toxicity test results are acceptable, pursuant to EPA's WET test methods in 40 CFR 136 (additional TAC may be established by the Department). The effluent and reference toxicant must meet specific criteria as defined for each test method.

Toxic Unit (TU) is a measure of toxicity in an effluent as determined by the acute toxicity units (TU_a) or chronic toxicity units (TU_c) measured. The larger the TU value, the greater the toxicity.

Toxic Unit - Acute (TU_a) is 100 times the reciprocal of the effluent concentration that causes 50 percent of the organisms to die in an acute toxicity test (TU_a = 100/LC₅₀) (see LC₅₀).

Toxic Unit - Chronic (TU_c) is 100 times the reciprocal of the effluent concentration that causes no observable effect on the test organisms in a chronic toxicity test (TU_c = 100/IC₂₅).

Toxicity Identification Evaluation (TIE) is a set of site-specific procedures used to identify the specific chemical(s) causing effluent toxicity.

Toxicity Reduction Evaluation (TRE) is a site-specific study conducted in a step-wise process to identify the causative agents of effluent toxicity, isolate the source of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity after the control measures are put in place.

Water Quality Criteria are elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use.

Water Quality-based Effluent Limit (WQBEL) is a NPDES permit limit that is developed to ensure protection of aquatic life or human health consistent with applicable State water quality standards.

Water Quality Standard (WQS) Water quality standards are provisions of State or Federal law which consist of a designated use or uses for the waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare and enhance the quality of water.

Whole Effluent Toxicity (WET) is the total toxic effect of an effluent measured directly with a toxicity test. i.e.

Whole Effluent Toxicity (WET) Test is a procedure using living organisms to determine whether a chemical or an effluent is toxic. A toxicity test measures the degree of the effect of a specific chemical or effluent on exposed test organisms.

WET Permit Trigger is a threshold level for WET in an NPDES permit, established by a permit writer; this is used to trigger accelerated WET monitoring and/or TIE/TREs when there is no reasonable potential for WET and no WET permit limit.

SOUTH DAKOTA'S WHOLE EFFLUENT TOXICITY (WET) PROGRAM

INTRODUCTION AND BACKGROUND

The federal Clean Water Act states that “. . . it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited.” In addressing the concerns of human health protection and aquatic biota protection, EPA and the states use an integrated strategy consisting of both biological and chemical methods to identify and control the release of toxic chemicals from industrial and municipal sources. The control of toxics in wastewater effluent is an important objective of the Department. The integration of bio-monitoring requirements with technology-based and water quality based numeric permit limits is a means to accomplish this objective.

The federal Clean Water Act authorizes the National Pollutant Discharge Elimination System (NPDES) permitting program to regulate the discharge of pollutants into the nation's waterbodies. South Dakota has been delegated to implement this permitting program, which is called the South Dakota Surface Water Discharge (SWD) permitting program. SWD permits must contain effluent limits to ensure compliance with state water quality standards. Both EPA and state regulations dictate that SWD permits prohibit any pollutant or pollutant parameter that is or may be discharged at a level that causes or has the reasonable potential to cause any state water quality criteria to be exceeded. Where state standards contain numerical criteria for toxic pollutants, permits contain effluent limits necessary to ensure compliance with these standards. Therefore, Whole Effluent Toxicity (WET) monitoring and limits in SWD permits comprise an important element for protection of water quality, in particular the “free from toxics” narrative standard. It is important to note that South Dakota does not have WET water quality standards. However, WET testing is an approved method under 40 CFR Part 136 that the Department uses as a tool for implementation of the narrative toxicity standard.

Many states have adopted WET control programs. The state programs vary in some degree from one another, as do the policies and programs currently being implemented by each of the EPA Regions. South Dakota has established its own program suited to the unique circumstances and needs of the state. However, in doing so, South Dakota must be consistent with the goals of the national program and meet minimum EPA regulations and policy requirements. The Surface Water Quality Program will integrate WET requirements into SWD permits as needed based on these procedures.

This document is intended to provide clarification to Department staff and to permittees for implementing the WET control program in South Dakota.

PERMITTING GUIDANCE

Basic Permitting Principles for Whole Effluent Toxicity

1. Permits must be protective of water quality.
 - a. The discharge of toxics must be controlled to be consistent with the beneficial use classification of the waterbody receiving the discharge. All waters of the State have aquatic life protection needs.
 - b. The reasonable potential determination for WET will be based on South Dakota's *Reasonable Potential Implementation Procedures for SWD Permits* document.
2. Permits must be written to avoid ambiguity and ensure enforceability.
 - a. At a minimum, all facilities that have been determined to be a major facility or a significant minor facility must be evaluated to determine if there is a reasonable potential for toxicity in the discharge, based on South Dakota's *Reasonable Potential Implementation Procedures for SWD Permits* document.
 - 1) If a reasonable potential **does** exist, all **major and minor** permits must require WET testing for two species with either WET limits or a compliance schedule requiring future compliance with the WET limits.
 - 2) If a reasonable potential for toxicity in the discharge **does not** exist, all **major** permits must require two species monitoring with a reopener clause calling for inclusion of limits if toxicity occurs. The need for continued WET monitoring and/or limits will be re-evaluated with each permit renewal.
 - 3) If a reasonable potential for toxicity in the discharge **does not** exist, **minor** permits must contain a reopener clause calling for inclusion of WET monitoring and WET limits if toxicity occurs. The need for WET monitoring and/or limits will be re-evaluated with each permit renewal.
 - b. All permits subject to WET requirements shall contain language for acute and/or chronic monitoring, automatic triggers for conducting accelerated testing, Preliminary Toxicity Investigations (PTI), and Toxicity Identification Evaluation/Toxicity Reduction Evaluation (TIE/TRE).
 - c. All permits subject to WET requirements shall include provisions to increase monitoring frequency (i.e., accelerated testing) due to a violation(s). It must be clear that these additional tests only determine the continued compliance status with the limit. These tests are **not** to verify the original test results.
 - d. Permits that have Acute WET requirements must contain the chronic re-opener clause. This provides the Department the means to re-open and modify the permit by changing from acute to chronic monitoring and/or limits, where necessary.

- e. Permits shall also contain the generic re-opener clauses that are sufficient to provide the Department the means to re-open, modify, or revoke and reissue the permit where necessary.
 - f. WET monitoring and limits shall appear in the same sections of the permit that other effluent monitoring and limits appear, when applicable.
 - g. Toxicity testing species and protocols shall be accurately referenced in the permit.
3. When a permittee is not in compliance with a whole effluent toxicity limit, the permittee must be compelled to come into compliance with the limit as soon as possible.
- a. Compliance dates must be specified via a permit modification if needed.
 - b. Permits shall contain requirements for corrective actions, such as a TIE/TRE.
 - c. If a violation of a WET limit occurs, enforcement will be guided by the permittees efforts in investigating and eliminating the source of toxicity. This approach is built on concepts of conducting accelerated testing, establishing patterns of toxicity, and automatic triggering for undertaking a PTI, or a TIE/TRE.
 - d. Formal enforcement action is discretionary and will be conducted in accordance with the Department's *Enforcement Response Guide*.

General Permitting Implementation Guidance

The major purpose of WET controls is to detect and eliminate toxicity in those cases where its presence is unknown or caused by interaction between otherwise innocuous substances. If WET is demonstrated, and it is established that it is due to a known toxicant, the toxicant must be controlled by WET limits, specific numerical limits, or both methods.

The permit writer shall consider all available data and all factors listed in South Dakota's *Reasonable Potential Implementation Procedures for SWD Permits* document for more detailed guidance on when WET monitoring and/or limits are needed. Exceptions shall be based on the professional judgment of the permit writer and may need to be incorporated into permits for those major and significant minor facilities where there is no reasonable potential for having a toxic discharge.

Permits shall contain acute and/or chronic WET limits where reasonable potential for toxicity exists. Recommended permit language is attached as Appendix A.

To provide an adequate administrative record, the permit writer shall provide a detailed explanation in the Statement of Basis (SOB) for each permit that includes WET Monitoring. The SOB shall include the justification for including or excluding WET monitoring and/or limits, the approval of variations to the testing requirements (e.g., approval of a carbon dioxide overlay), and the approval to reduce monitoring (i.e., frequency, alternate species). Please note that WET tests were designed to test both species at the same time. As a rule, we should not be alternating species. Those that have previously been approved to alternate, may continue. However, if there

is a failure, this shall be removed from their permits via a modification.

Permits with WET monitoring only (no limit) shall, at a minimum, contain the standard language for a TIE/TRE, accelerated testing, and PTI requirements as discussed below, like those permits that contain numeric WET limits.

These permits will also contain the reopener clause calling for the inclusion of WET limits if toxicity occurs, with a compliance schedule in the permit if the permittee needs time to comply with the WET limits. The amount of time provided in the compliance schedule will be governed by the need to ensure toxicity problems are being addressed in a timely manner. Things to consider in the compliance schedule are such factors as: the “good faith efforts” of the permittee, use impairments, schedules for toxicity studies, and implementation of toxicity control mechanisms.

The permit writer shall use this document to determine the type of toxicity monitoring (acute or chronic), the species selected, monitoring frequency, and exact dates for implementation by the permittee. The final determination on what to include shall be left to the discretion of the permit writer. All acute or chronic toxicity that has occurred shall be documented in the Statement of Basis (SOB).

All facilities for which it has been concluded that a reasonable potential to discharge toxicity exists shall contain: two-species acute and/or chronic testing, accelerated testing requirements, and the requirements for completion of a PTI if toxicity occurs. When appropriate, the acute and/or chronic limit can be delayed. The amount of the delay in the application of acute and/or chronic WET limits can be incorporated into a compliance or permit schedule.

Additional Numerical Limits

Compliance with WET limits does not exclude the imposition of additional numerical limits on specific pollutants when appropriate. These limits will be based on Technology-Based Effluent Limits (TBELs) and Water Quality-Based Effluent Limits (WQBELs). In addition, it may be necessary to add a pollutant-specific limit in response to findings in a TIE/TRE to ensure continued compliance with a WET limit.

Acute vs. Chronic Determination (See Appendix C - Figures 1 & 2)

1. The determination of whether acute or chronic WET requirements would be applicable in a permit will typically be based on the ratio of the critical instream low flow, as defined by South Dakota’s WQS, to the effluent design flow. If this ratio is $< 10:1$, the permit writer will evaluate the need for chronic WET testing. Conversely, if the ratio is $\geq 10:1$, the permit writer will evaluate the need for acute WET testing.
2. EPA’s TSD recommends a $<100:1$ ratio. However, high dilution factors are not adequately reflected in states with arid climates such as South Dakota. Therefore, South Dakota will be using the $<10:1$ ratio.
3. Chronic Monitoring should be used in all streams when the chronic dilution factor is $< 10:1$, including if no dilution (0 cfs) is allowed, for outfalls within 5-10 mi of a stream

classified as a fishery (2,3,4,5,6) . This is because the acute test does not adequately predict chronic toxicity at low dilutions.

- a. **River/Tributary/Stream:** Chronic WET is appropriate for a stream-to-effluent-flow-ratio of $\leq 10:1$, including if streamflow available for dilution is zero. Requiring an acute limit only would not be protective of the Chronic WET standard at low (including zero) dilution of effluent to a classified fishery (beneficial use classifications 2,3,4,5,6 within 5-10 mi of outfall). An annual/seasonal/monthly chronic lab dilution series would be calculated for a permit based on percentile or design effluent flow and the portion of annual/seasonal/monthly 7Q5 or 7Q25 stream low flows allowed for mixing.
4. If the discharge is to a natural WETLAND - Acute WET should be used for a discharge to a wetland classified with the minimum beneficial use of (9); chronic WET may need to be assessed for a discharge to a wetland with a higher beneficial use classification. This is because the critical directional low flow of a wetland is considered zero, no mixing for dilution is allowed for either chronic or acute WET for a discharge to a wetland.
 - a. **Wetland:** Acute WET is appropriate given the minimum beneficial use classification of (9) and lack of directional flow for mixing. South Dakota’s mixing policy does not allow dilution mixing of effluent in wetlands. Standard acute lab dilution series would apply.
5. Chronic Monitoring may also be used to follow up on acute monitoring to more exactly determine the potential for chronic toxicity in the receiving water.
6. To calculate the Instream Waste Concentration (IWC)

- a.
$$IWC = \frac{(\text{facility design flow,80th Percetile Flow,etc.})}{[\text{facility design flow,80th Percentile Flow,etc.}+7Q5 (7Q25)]} * 100$$

7. The Department maintains the authority to assign acute or chronic WET testing requirements based on specific facility information including but not limited to dilution, resource you’re trying to protect, industrial contributions, facility compliance, financial burden, and the permit writer’s best judgment.

WET Testing Methods

1. Acute and chronic testing methods can be found in the latest revision of “*Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.*” Fifth Edition, (EPA-821-R-02-012) U.S. EPA, October 2002 and “*Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms,*” Fourth Edition, (EPA-821-R-02-013), U.S. EPA, October 2002.

Altering of Test Methods

1. If the Department determines that the toxicant in question is, or will be, in compliance with existing water quality standards; WET monitoring frequency, sampling, or the effluent limit may be modified provided it can be shown that such actions are still sufficient to attain and maintain applicable numeric and narrative water quality standards. This will ensure that the main purpose of the test does not continue to be masked by the known toxicant.

Other factors to add or remove alternate testing methods may be if the facility upgraded, changed processes since they gained approval or based on a TRE/TRI. This will be decided on a case-by-case basis and according to BPJ.

Examples:

- a. *If it is established that WET is caused by a metal and the discharger is on an acceptable compliance schedule to reduce its metal levels or is complying with water quality-based effluent limits established for that metal, the whole effluent protocol could be modified by the Department simply by allowing the use of ethylenediaminetetraacetic acid (EDTA) which is known to mask a variety of known metals. Although this modification may mask some other toxicant, the test will still adhere more closely to its basic intent than it otherwise would.*
 - b. *Ammonia toxicity based on pH drift – The use of a CO₂ overlay will be allowed to control pH drift, and where ammonia toxicity due to pH drift is being identified, a higher pH increases the toxicity of ammonia. This is the most common example of test modification. It should be emphasized that this is the preferred way to control “creeping pH” during the tests, and that the use of more radical procedures, such as acid addition or zeolite treatment, has not been found to be appropriate. If pH control is necessary, the value that is selected to cap the test must reflect the pH value of the receiving body of water or a value that represents the combination of effluent and receiving water. During the test, the pH would be allowed to reach this level and then maintained. The permit writer shall include allowable test modifications in the SOB and the permit. In addition, the permit should have an ammonia limit in place or added.*
2. The use of alternate testing procedures must be approved in advance by the Department and authorized in the permit. The reasoning must be explained and documented in the SOB.
 - a. For those permittees that say they were approved at one time, they should provide documentation if possible and their permit will be modified.
 - b. If the permittee cannot produce approval documentation, or it is a new request, a letter/email will be sent, and a permit modification will be completed if approved.

Invalid WET Samples or Tests

Test conditions and Test Acceptability Criteria (TAC) is a set of minimum requirements for performing toxicity tests. These minimum requirements are clearly identified in the test method manuals latest revision of “*Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.*” Fifth Edition, (EPA-821-R-02-012) U.S. EPA, October 2002 and “*Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms,*” Fourth Edition, (EPA-821-R-02-013), U.S. EPA, October 2002.

Both effluent and control toxicant tests must meet the required test conditions and TAC. Any test not meeting these requirements is considered invalid (i.e., Acute WET mortality in the control must be 10% or less for the results to be considered valid; Chronic WET is 20%). The recommended test conditions shall be looked at on a case-by-case basis to determine the validity of the test, which may or may not invalidate the test. A failed control toxicant test result should not be used as a *de facto* criterion for rejection of individual effluent tests but should look at the test conditions of both the control and effluent toxicants on a case-by-case basis.

Invalid tests cannot be used to meet the required monitoring frequency. All invalid tests must be repeated with a newly collected sample, as soon as possible, but no later than 14 days. A repeat of an invalid test does not count as an additional test, but as a replacement for the original invalid test. This additional test must be completed within the required monitoring period. With Department approval, the test may count if it was started during the required monitoring period.

Any WET sample or test determined to be invalid by the Department or by the lab, based on the test conditions or the TAC is not considered a WET limit violation. However, if there was negligence by the facility, this may be cause for the Department to pursue an enforcement action in accordance with the Department’s *Enforcement Response Guide*. In addition, if the repeat test cannot be completed within the required monitoring period, it will be considered a failure to collect a valid sample and therefore is a permit violation, but not an effluent violation.

Holding Times

1. Acute – Acute tests have a required holding time of 36 hours or less. This is from the time of sample collection to the start of the test. This is a TAC requirement.
2. Chronic – Chronic tests have a required holding time of 36 hours for all samples utilized for testing. The TAC requires 3 samples for the 7 Day Chronic tests and recommends that these samples be taken on days 1, 3 and 5. Samples collected on days 3 & 5 are used as renewal water. Renewal samples that are not taken on days 3 and 5 usually run into holding time issues.
 - a. Day 1 (Sample 1) has a required holding time of 36 hours.
 - b. Days 3 & 5 (Samples 2 & 3) have a required holding time of 36 hours.
 - i. Samples taken for use on days 3 & 5 are required to meet the 36-hour

holding time. Once the test is initiated and where shipping problems arise, SDDANR may allow an extension of shipped sample holding times of up to 72 hours. The request for a variance in sample holding time, must be directed to SDDANR and should include supportive data which show that the toxicity of the effluent sample is not reduced (e.g., because of volatilization and/or sorption of toxics on the sample container surfaces) by extending the holding time beyond 36 hours. However, in no case shall more than 72 hours elapse between collection and first use of the sample.

- ii. The holding time and any adverse effects must be documented by the lab. The initial request for a variance may be verbal; however, the request, along with the time, date, and from whom approval was granted, must be documented, and attached to the appropriate WET DMR.

3. Receiving Water when used as dilution water.

- a. The receiving water sample should be collected immediately prior to the test but never more than 96 hours before the test begins.

Dilution Series

The toxic impact of a pollutant is directly related to the amount of the toxicant in the receiving stream. Therefore, the amount of instream flow and any background concentration of a toxicant are critical to the level of toxicity in the receiving stream. Dilution is related to the receiving water stream flow, the size of the discharge, whether there is an outfall diffuser, etc. The lower the available dilution, the higher the potential is for toxic effects.

The standard test methods manual (U.S. EPA 1995a, 2002a, 2002b, 2002c) suggests, but does not require, a dilution series of 6.25%, 12.5%, 25%, 50%, and 100% effluent for most effluents when little information is known about the effluent being tested and it is believed that the effect concentration is within the 6.25% to 100% effluent range.

In many situations, a more appropriate dilution series can be selected based on the history of repeated testing of a given effluent. The WET test methods manuals recommend a dilution factor of ≥ 0.5 for preparing test concentrations. This recommendation does not fix the dilution factor but is provided to establish a lower limit on the dilution factor. The use of dilution factors greater than 0.5 is encouraged when historical testing data indicates that an effluent is relatively consistent and effect concentrations generally fall within a given range.

If historical testing shows toxicity consistently within a specified range of concentrations, the test dilution series for future tests can be selected to focus on that range. For example, if the LC50 for a given effluent is consistently between 50% and 100% effluent, it may be needless to continue testing concentrations as low as 6.25% or 12.5% effluent. A larger dilution factor, such as 0.75 could be used to provide a dilution series of 31.6%, 42.2%, 56.3%, 75%, and 100%. The permit writer should be cautious not to narrow the range of concentrations too much, to avoid causing the effect concentration to fall outside the test concentration range when an unusually toxic sample is encountered (USEPA 2000a).

1. Acute and Chronic Test Dilution Series

- a. A series of at least 5 effluent dilutions and a control shall be tested. The dilution series shall contain the instream waste concentration (IWC). The dilution series is calculated based on the IWC.
- b. The IWC and dilution series shall be evaluated and clearly stated in the permit.
- c. **Acute WET tests** shall use 100%, 50%, 25%, 12.5%, 6.25% and a control as a starting point. Which is the minimum EPA recommended dilution factor of 0.5.
- d. **Chronic WET tests** shall be 100% effluent, IWC, 3 dilutions bracketing the IWC, and a control as a starting point. (1) 100%, (2) $(IWC + 100)/2$, (3) IWC, (4) $IWC/2$, and (5) $IWC/4$.
- e. For effluent dominated river/tributary/stream waters (low flow), including when the receiving water is 100% effluent (no flow) and there are no historical failures, the standard dilutions series of 100%, 62.5%, 25%, 12.5%, 6.25% and a control can be used as a starting point.

**Note - If dilutions are too close together (< 5%), they are more difficult to test and to find any significant differences.*

Dilution Water - Receiving Water vs. Laboratory (Reconstituted/Synthetic) Water

Dilution water may be either standard laboratory (lab) water or receiving water. The type of dilution water used in effluent toxicity tests will depend largely on the objectives of the test.

1. Lab Water: If the objective of the test is to estimate the absolute acute or chronic toxicity of the effluent (**this is the primary objective of Surface Water Discharge permit-related toxicity testing**), then standard lab dilution water as defined in each test method is used. Lab water must have approximately the same characteristics (alkalinity, hardness, and pH) as the receiving water.
2. Receiving Water: If the objective of the test is to estimate the toxicity of the effluent in uncontaminated receiving water, then the test may be conducted using dilution water consisting of a single grab sample of receiving water (if non-toxic). This sample shall be collected either; upstream and outside the influence of the outfall, or with other uncontaminated natural water (ground or surface), or standard dilution water having approximately the same characteristics (alkalinity, hardness and pH) as the receiving water.

The permit writer shall try to determine the general characteristics of the receiving stream (alkalinity, hardness and pH). This shall be compared to the table below to determine the hardness category of the dilution water. The hardness category of the dilution water shall be clearly stated in the permit. **If the general characteristics are unknown, then moderately hard dilution water shall be stated in the permit.**

TABLE FOR SELECTING HARDNESS OF RECEIVING STREAM HARDNESS¹

	Hardness ²
Very soft	< 27
Soft	27 - 60
Moderately hard	61 - 140
Hard	141 - 230
Very Hard	> 230 - 320

¹ The hardness ranges in this table are derived from the values taken from the Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Table 7, Fifth Edition, October 2002, and Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Table 3, Fourth Edition, October 2002 and modified to eliminate any numerical gaps between hardness categories.

² Expressed as mg CaCO₃/L.

The Department typically requires that facilities use lab water as a general rule. In rare instances, receiving water may be used; however, the facility must have prior written approval via a permit modification from the Department.

Sample Collection Method/Type

The sampling site should be after the last treatment process (including disinfection and de-chlorination) and at a location in the discharge stream as close to the actual discharge point as feasible. There may be no removal of chlorine or any other constituent by chemical or physical means prior to testing the sample without specific approval from the Department. Sampling shall be conducted according to the corresponding WET methods manuals and shall be clearly stated in the permit. Generally, the Department requires the following:

1. Acute
 - a. Acute WET samples shall be collected as a single Grab sample. 24-hour composite samples may be used for a continuous discharger.

2. Chronic
 - a. Chronic WET samples shall be collected as a 24-hour Composite sample. Grab samples may be used for an intermittent discharger.

 - b. A minimum of three samples are required for seven-day chronic tests, but variations in the sampling scheme (i.e., the days on which new samples are collected, the number of samples collected, etc.) are also allowed for that specific sample on a case-by-case basis. This must be approved by the Department in writing prior to collecting the next sample. Extenuating circumstances must exist (i.e., delays in shipping at no fault of the facility, weather related issues, etc.).

Monitoring and Sampling Frequency

The frequency for monitoring WET parameters should be determined on a case-by-case basis by the permit writer. Monitoring frequency should be evenly spaced throughout the year so that seasonal variability can be ascertained. The decisions for setting the monitoring frequency should be set forth in the SOB. The intent is to establish a frequency of monitoring that will detect most events of noncompliance without requiring needless or burdensome monitoring. Under normal conditions, the Department recommends that WET parameters be monitored monthly for continuous dischargers and on a quarterly basis for intermittent dischargers. Acute samples shall be collected on a two-day progression when feasible, i.e., if the first sample is on a Monday, during the next sampling period, the sampling shall begin on a Wednesday, etc.

Chronic samples do not need to meet the two-day progression because 3 samples are already being collected on days 1, 3 and 5. This schedule is set up so that the permittee provides fresh effluent samples for the chronic test to utilize on days 1 & 2, fresh effluent sample for renewal on days 3 & 4, and fresh effluent sample for the renewal on days 5 & 6 with the test ending on day 7.

It is recommended that sampling be completed during the first part of the monitoring period, thus reserving the later part for sampling complications (i.e., invalid tests, shipping, weather, etc.).

1. Monitoring Frequency

a. Continuous Dischargers

- i. Monitoring should be at least MONTHLY for permits that have never had WET testing or those that do not have a total of 24 completed (12 *Ceriodaphnia dubia* and 12 *Pimephales promelas*) WET tests.

b. Intermittent Dischargers

- i. Monitoring should be at least QUARTERLY for permits that have never had WET testing or those that do not have a total of 24 completed (12 *Ceriodaphnia dubia* and 12 *Pimephales promelas*) WET tests.

- c. **Exceptions to the MONTHLY/QUARTERLY monitoring:** the permittee has been approved or required by the Department to alter from this frequency based on a TIE/TRE, compliance schedule, program requirements, the previous permit, or through a permit modification for a different (bi-monthly, quarterly, annually, etc.) monitoring schedule. The sampling frequency shall be determined by the permit writer on a case-by-case basis and shall be documented in the SOB.

Reduced Monitoring

For routine WET testing requirements, a reduction in monitoring frequency may be allowed where the permittee has demonstrated compliance with 24 consecutively passed tests (12 *Ceriodaphnia dubia* and 12 *Pimephales promelas*) which equates to 12 months for monthly monitoring or 12 quarters for quarterly monitoring. The Department shall look at whether limits

have been met, the variability of test results, and any other information including pollutant potential and facility type.

A written request to reduce monitoring must come from the permittee and be approved by the Department. This shall be done through a permit modification without additional public notice.

EPA R&D in Duluth and the 2018 PQR advised that WET tests were designed to run both species at the same time because they look at different toxicants, however this is not a requirement. Therefore, alternating species is strongly discouraged. EPA also recommends a minimum of quarterly WET testing. South Dakota will allow alternating quarters on a case-by-case basis. If there is a WET failure, permittees will follow the TIE/TRE for retests and accelerated testing procedures. Which will, at least temporarily remove any reduced monitoring.

Species and Test Method Selection

1. Acute
 - a. The acute WET test will be conducted on *Ceriodaphnia dubia* (water flea) using a 48-hour static non-renewal test, and on *Pimephales promelas* (fathead minnow) using a 96-hour static renewal (with renewals every 48 hours) test. Methods 2002.0 and 2000.0 respectively.
 - b. There are two temperatures that the test can be completed at: 20° C and 25° C.
 - i. Specify 20° C in the permit if the discharge goes to a cold-water stream.
 - ii. Specify 25° C in the permit if the discharge goes to a warm water stream.
2. Chronic
 - a. The chronic WET test will be conducted on *Ceriodaphnia dubia* (water flea) and *Pimephales promelas* (fathead minnow) using a 7-day static renewal (with renewals every 24 hours) test. Methods 1002.0 and 1000.0 respectively.
 - b. Chronic tests can only be done at 25° C.
 - i. Specify 25° C in the permit.

Acute and Chronic Criteria (Narrative WET Criteria)

1. Acute WET Criteria
 - a. The EPA recommended in-stream criteria for protection of aquatic life against acute effects is 0.3 TU_a to the more sensitive of at least two different test species.

2. Chronic WET Criteria

- a. The EPA recommended in-stream criteria for the protection of aquatic life against chronic effects is 1.0 TU_c . to the more sensitive of at least two different test species. *This will protect against short-term excursions above the chronic criterion of 1.0 TU_c and meet WQS, if used in lieu of the mass balance equation listed below.*

Acute and Chronic WET Limits - Limits shall be stated clearly in the permit (i.e., LC_{50} , TU_a , IC_{25} , and TU_c).

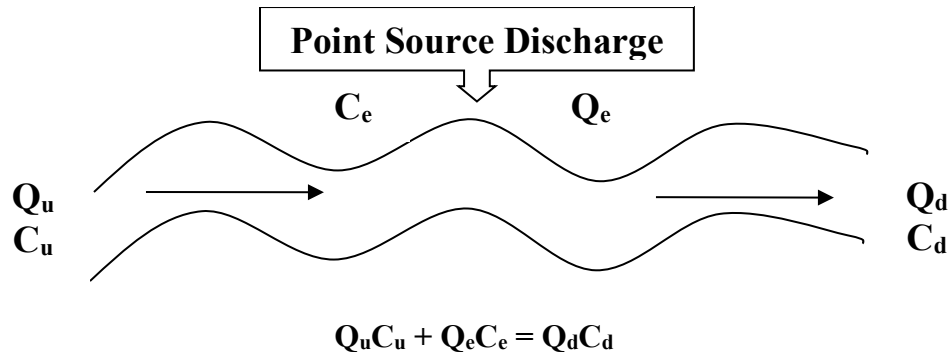
1. Acute WET Limits

- a. The acute WET limit shall be written into the permit and expressed as a Maximum in TU_a . This is $100/\text{LC}_{50}$ which represents an estimate of the effluent concentration which is lethal to 50% or more of the test organisms in the time period prescribed by the test.
- b. The acute WET limit shall be stated as $<1.0 \text{ TU}_a$, which is equivalent to $\text{LC}_{50} >100\%$ effluent.
- c. Acute test failure is defined as lethality/mortality to 50% or more of the test organisms at any dilution effluent or $\geq 1.0 \text{ TU}_a$. The effluent value must be $< 1.0 \text{ TU}_a$ to indicate a passing test. Any value $\geq 1.0 \text{ TU}_a$ will constitute a failure.
- d. Current permits with a LC_{50} and expressed as a pass/fail WET limit will retain the LC_{50} but facilities will be asked to report the values as TU_a in the current permit cycle. Reissued, new permits, and permits with new WET monitoring or limits shall be LC_{50} and expressed in TU_a .

2. Chronic WET Limits

- a. The chronic limit shall be written into the permit and expressed as a Maximum in TU_c . This is $100/\text{IC}_{25}$ which represents a point estimate of the toxicant concentration that would cause a 25-percent reduction in a biological measurement (e.g., reproduction, growth or mortality), calculated from a continuous model (i.e., Interpolation Method, etc.) by the end of the chronic exposure period.

- b. The following mass balance equation will be used to determine the chronic WET limits when possible:



Where,

- Q_u = Receiving stream flow, in cubic feet per second (cfs);
- C_u = Ambient upstream toxicity, in TU_c (Assume 0 TU_c unless data is available);
- Q_e = Effluent discharge flow rate, in cfs;
- C_e = Water quality based effluent limit for toxicity in TU_c ;
- Q_d = Downstream flow (equal to $Q_u + Q_e$), in cfs; and
- C_d = 1.0 TU_c

- c. The chronic WET limit shall be stated as <#. # TU_c , which is equivalent to IC_{25} > IWC.
- d. Chronic test failure is defined as a reduction to 25% or more of the test organisms at any dilution effluent or $\geq TU_c$ limit. The effluent value must be < TU_c limit to indicate a passing test. Any value $\geq TU_c$ limit will constitute a failure.
- e. The IC_{25} WET limit will be retained in current permits, but facilities may be asked to report the values as TU_c in the current permit cycle. Reissued, new permits, and permits with new WET monitoring or limits shall be IC_{25} and expressed as TU_c .
- f. Backsliding of chronic WET limits is permissible provided that recent documentation shows that less stringent limits are protective of current stream conditions (See: Smithfield and Sioux Falls Addendum # 2):
- i. Changes in stream conditions
 - ii. Changes or upgrades to facilities, etc.
 - iii. New stream or effluent data

**NOTE – The IC_{25} must equal the IWC (See WET IMP FAQs)*

**NOTE – Changing of dilutions is not backsliding if changes occurred to the waterbody.*

- g. In addition, in all Chronic tests, at any effluent dilutions, there shall be no Acute toxicity (LC_{50}). This is not a separate Acute WET test unless specified in the

permit, but an analysis that is conducted based on daily observations as outlined in the current version of the “*Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*,” 4th Edition, October 2002 (as allowed by Sections 11.1.2 for Method 1000.0 and 13.1.2 for Method 1002.0).

- i. The Acute WET limit shall be $<1.0 \text{ TU}_a$, which is equivalent to LC_{50} at any dilution of effluent.
- ii. Acute test failure is defined as lethality/mortality to 50% or more of the test organisms at any dilution effluent or $\geq 1.0 \text{ TU}_a$. The effluent value must be $< 1.0 \text{ TU}_a$ to indicate a passing test. Any effluent value $\geq 1.0 \text{ TU}_a$ will constitute a failure.

Toxicity Units (TUs) Conversion

- 1. Acute Toxic Unit (TU_a) = $100 / \text{LC}_{50} = \text{TU}_a$
- 2. Chronic Toxic Unit (TU_c) = $100 / \text{IC}_{25} = \text{TU}_c$

Example of IC25 to Tuc

IC25	TUc
100	1.0
90	1.1
80	1.3
75	1.3
70	1.4
68	1.5
60	1.7
50	2.0
40	2.5
30	3.3
25	4.0
21	4.8
20	5.0
12.5	8.0
10	10.0
6.25	16.0
5	20.0
3.125	32.0

WET Test Reporting

1. All WET test results shall be summarized and reported on the appropriate Acute or Chronic Toxicity Test Report Form.
 - a. Acute and chronic reporting forms are located in Appendix B.
 - b. These forms should be tailored to each permit as needed.
 - c. These forms shall be filled out by the WET testing Labs.
2. The appropriate form shall be submitted along with the corresponding DMR form and submitted by the 28th of the month following the reporting period.
3. The lab data sheets, and the chain of custody shall be submitted to the Department. They must be with the corresponding DMR form.

WET Test Result Evaluations

Upon permit renewal, the Department shall review the WET test results to determine if a pattern of toxicity exists. The reported data results from the Acute and Chronic Test Reporting Forms, WET discharge monitoring reports (DMRs), and actual lab data results for the following information:

1. Compare to the permit language for accuracy and compliance.
2. Sample handling and collection.
3. Review of test methods, test conditions, and test acceptability criteria (TAC).
4. Review of control/reference toxicant.
5. Failure of limits or evidence of reasonable potential.

Pattern of Toxicity

There are two ways to determine if a pattern of toxicity exists:

1. A pattern of toxicity will be defined in the permit as determined by the results of a series of up to 12 WET tests over a 12-month period (based on the accelerated testing requirements), using a full dilution series and the species found to be most sensitive.
2. A pattern of toxicity may also be established based on all past toxicity failures using Best Professional Judgment (BPJ) (i.e., failed sample every spring, etc.). The establishment of a pattern of toxicity triggers a PTI and a TIE/TRE (*See Appendix C – Figure 3*).

If a pattern is demonstrated, it is indicative of an ongoing discharge of toxicity and potential use impairment. In such cases, the decision to pursue enforcement action would be based on the Department's "Enforcement Response Guide."

Preliminary Toxicity Investigations (PTI)

Any WET limit violation or an established pattern of toxicity requires the permittee to automatically begin (if one is not already in progress) an evaluation of the possible causes of the toxicity (*See Appendix C – Figure 3*). This is the permittee's chance to find the cause of the toxicity and make a proposal for its elimination. A maximum of 30 days is allowed for this evaluation. This period may be extended if extenuating circumstances exist, and written approval is granted prior to exceeding 30 days. Close coordination and communication with the Department is also required. The results of this investigation will aid in determining the need for further investigations, studies, TIE/TRE, permit modification, and/or enforcement action.

Accelerated Testing

When the WET limit is exceeded during routine testing, the permittee shall perform accelerated WET testing to establish whether a pattern of toxicity exists. Accelerated testing shall begin within 14 days after the permittee becomes aware of the test results exceeding the permit limit. During the accelerated testing phase, if any additional sample demonstrates toxicity or is a failure, there is a pattern of toxicity and the permittee must initiate the TIE/TRE process. Once the TIE/TRE has begun, accelerated testing may cease. Provided that the TIE/TRE process includes sampling at least monthly.

The permittee may elect to skip accelerated testing and move directly into a TIE/TRE, or the Department may direct the permittee to begin a TIE/TRE based on past test results.

There are two specific paths for accelerated testing, and they are as follows (*See Appendix C – Figure 3*):

a. Known Toxicant

If a WET permit limit is exceeded and the source of the toxicity is known (e.g., a temporary plant upset, etc.), the facility shall initiate a Preliminary Toxicity Investigation (PTI) and correct the source of the toxicity immediately. The permittee shall also conduct one additional toxicity test using the same species and test method that failed. **This test shall begin within 14 days of notification/receipt of the test results exceeding the permit limit or trigger.** If this additional accelerated test does not exceed WET permit limits, then the permittee may return to their regular testing frequency. If the additional accelerated test exceeds WET permit limits, then the permittee must submit a TIE/TRE work plan with a timetable to eliminate the toxicity. This TIE/TRE work plan shall be considered part of the permit.

b. Unknown Toxicant

If a WET permit limit is exceeded, and the source of the toxicity is not known, the facility must immediately initiate a preliminary toxicity investigation (PTI). The

permittee also must conduct accelerated testing that shall consist of 12 WET tests conducted at a maximum of 4-week intervals over a 12-month period using the same species and test method that failed. The Department reserves the right to increase the accelerated testing frequency to bi-weekly (twice per month) upon written notification to the permittee. **Accelerated testing shall begin within 14 days of notification/receipt of the test results exceeding the permit limit or trigger.** If none of the additional tests exceed WET permit limits, then the permittee may return to their regular testing frequency. If any of the accelerated tests exceed WET permit limits, then the permittee must submit a TIE/TRE work plan with a timetable to eliminate the toxicity. This TIE/TRE work plan shall be considered part of the permit.

Toxicity Identification Evaluations (TIE) and Toxicity Reduction Evaluations (TRE)

If the preliminary toxicity investigation (PTI) could not determine the cause of the WET failures, then the permittee shall begin the formal TIE/TRE process (*See Appendix C – Figure 3*). A TIE/TRE is done when toxicity is evident based on an established Pattern of Toxicity. The TIE determines the cause of toxicity. The TRE is a plan to reduce the toxicity of the discharge once the toxic component is identified. The type and complexity of the TIE/TRE are unique and highly site dependent. In addition, the discharger should always be more familiar with their operation than the regulatory agency and an excessive amount of procedural detail may inhibit an innovative approach. Therefore, the Department shall give a general “guidance” for the TIE/TRE process.

If the Department determines that a TIE/TRE is necessary, the Department will notify the permittee in writing. The permittee shall submit monthly progress reports that will be due by the 1st of every month until the TIE/TRE is closed. A TIE/TRE work plan shall be submitted by the permittee to the Department within 30 days following the effective date of the written notification letter.

Once the TIE/TRE has begun, accelerated testing may cease. TIE/TRE shall be reported on the DMRs for the species that the TIE/TRE has been needed. If the facility is using NetDMR, NODI 3 shall be used, and TIE/TRE shall be typed in the **comment section** of the electronic DMR. Initial efforts should be expended on characterization and identification of the toxicant(s). Procedures exist for rapidly narrowing the possibilities to certain groups of pollutants such as metals, non-polar organics, oxidants, etc. In many cases, the TIE/TRE may terminate at this point if it is conclusively shown that the problem is due to one distinct pollutant whose source, and method of correction, is known. This pollutant may be already controlled through a compliance schedule linked to a numerical limit. Alternatively, a numerical limit and/or compliance schedule may be subsequently imposed on the permittee.

Once the problem has been identified, the ultimate objective is elimination of the toxicity by changing facility procedures, process controls, upgrading treatment processes, local enforcement, or whatever other measure(s) may be necessary.

Toxicity problems will be controlled in most cases by following the above procedures. However, there may be situations when a “well-done” and “acceptable” TIE/TRE will reveal a problem requiring additional time before final resolution (i.e., facility upgrades).

Under these circumstances, relief may be granted through the language noted in Appendix A. The discharger has the burden of proof that a thorough TIE/TRE has been done and more time is needed to address the problem. Only then should permit relief be considered by the Department. The TIE/TRE will not be considered closed until written notification has been received from the Department.

The permittee shall follow the TIE/TRE process set forth by EPA. There may be circumstances where it is necessary for the facility to deviate from the established EPA procedures. Any deviation from the developed guidance must be submitted in writing prior to its use. Approval must be granted in writing by the Department. If toxicity spontaneously disappears during a TIE/TRE, the Department may require the permittee to conduct additional accelerated testing to demonstrate that no pattern of toxicity remains. This shall follow the UNKNOWN toxicity path of accelerated testing. If no pattern of toxicity is demonstrated, the TIE/TRE will be closed, and normal WET testing shall resume. Specific EPA guidance and procedures are cited below:
U.S. EPA. 1988. Methods for Toxicity Identification Evaluations:

- Phase 1, Toxicity Characterization Procedures (EPA/600/6-91/003);
- Phase 2, Toxicity Identification Procedures (EPA/600/R-92/080);
- Phase 3, Toxicity Confirmation Procedures (EPA/600/R-92/081);
- Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents Phase 1 (EPA/600/6-91/005F).

This information is available from the Region 8 EPA Office, its website: <http://www.epa.gov/npdes/whole-effluent-toxicity-wet>, or from the National Center for Environmental Publications and Information PO Box 42419, Cincinnati, OH 45242.

ENFORCEMENT GUIDANCE

Enforcement of WET Limit Violations

Enforcement will be based on the Department's *Enforcement Response Plan*.

Enforcement Liability

Any WET failure is a permit violation where the permit contains WET limits and is construed as a single violation per failed test.

The permittee may request relief from further biological and chemical investigation and testing if the source or cause of the toxicity could not be located or resolved despite completing all technically feasible investigations.

REFERENCES

1. Technical Support Document for Water Quality Based Toxins Control, EPA/505/2-90-001, U.S. EPA, March 1991.
2. Methods for Measuring Acute Toxicity of Effluent and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition, EPA-821-R-02-012, U. S. EPA, October 2002.
3. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA-821-R-02-013, U.S. EPA, October 2002.
4. Development of Water Quality-based Permit Limitations for Toxic Pollutants; National Policy, U.S. EPA Federal Register, Vol. 49, No. 48, March 9, 1984.
5. Methods for Aquatic Toxicity Identification Evaluations, Phase I Toxicity Characterization Procedures, Second Edition, EPA/600/6-91/003, February 1991.
6. Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity, EPA/600/R-92/080, September 1993.
7. Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity, EPA/600/R-92/081, September 1993.
8. Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I, EPA/600/6-91/005F, May 1992.
9. Whole Effluent Toxicity: Guidelines Establishing Test Procedures for the analysis of Pollutants. Federal Register, Vol. 60. No. 199, October 16, 1995.
10. Whole Effluent Toxicity (WET) Control Policy, EPA 833-B-94-002, July 1994.
11. Region 8 NPDES Whole Effluent Toxics Control Program, EPA Region 8, August 1997.
12. EPA Regions 8, 9 and 10 Toxicity Training Tool (TTT), US EPA, January 2010

APPENDIX A

SUGGESTED STANDARD SOB & PERMIT LANGUAGE

- Statement of Basis (SOB) Language
 - Acute and Chronic
 - **NOTE: Permit writers MUST provide more information on how WET RP is determined, justification for species modifications, how test reductions are determined and approved. This is an EPA Essential Action Item from 2018 PQR.**
- Permit Language
 - Definitions
 - Toxicity Limit - Reopener Provisions
 - Acute Toxicity and Chronic Toxicity Permit Language
 - Accelerated Testing, Pattern of Toxicity, Preliminary Toxicity Investigation (PTI), Toxicity Identification Evaluation (TIE) and Reduction Evaluation (TRE) language

SOB - USE THIS PAGE FOR SOB's WITH NO WET (Acute or Chronic) TESTING

(This is to be used in the corresponding sections of the SOB templates)

**Note – Permit writer may need to adjust the language as needed*

- *Permit Writers – If you deviate from either the RP or the WET documents you **MUST** explain why.*
- *Permit Writers – You may also need to alter the language below to fit your facility appropriately.*
- *Permit Writers – The paragraphs under SELF MONITORING can be combined into one if needed.*

WHOLE EFFLUENT TOXICITY

The SDDANR *Reasonable Potential Implementation Procedure for SWD Permits* was reviewed to determine if Whole Effluent Toxicity (WET) testing is applicable to **FACILITY NAME**. Following the guidance document, **FACILITY NAME** is not believed to have reasonable potential to cause or contribute to an exceedance of the SDSWQS for toxicity.

The draft permit will not include WET monitoring or limits. SDDANR has determined that due to the facility's minor discharge status, the lack of significant industrial contributions to the wastewater treatment facility, **(and the minimum fishery beneficial use of the receiving stream)**, there is no reasonable potential for WET. SDDANR has the authority to reopen the permit to add WET effluent limits, compliance schedules, monitoring, or other appropriate requirements.

SOB - USE THIS PAGE FOR SOB's WITH ACUTE WET TESTING

(This is to be used in the corresponding sections of the SOB templates)

**Note – Permit writer may need to adjust the language as needed*

- *Permit Writers – If you deviate from either the RP or the WET documents you **MUST** explain why.*
- *Permit Writers – You may also need to alter the language below to fit your facility appropriately.*
- *Permit Writers – The paragraphs under SELF MONITORING can be combined into one if needed.*

EFFLUENT LIMITS

12. Acute Toxicity, as measured by the Whole Effluent Toxicity (WET) test, shall be less than 1.0 toxic unit (TU_a). This is equivalent to LC50 >100%. This limit is based on the SDSWQS (ARSD, Section 74:51:01:12), the *South Dakota WET Implementation Plan*, and permit writer's judgment.

SELF MONITORING REQUIREMENTS

The SDDANR *Reasonable Potential Implementation Procedure for SWD Permits* was reviewed to determine if WET testing is applicable to **FACILITY NAME**. Following the guidance document, **FACILITY NAME** has reasonable potential to cause or contribute to an exceedance of the SDSWQS for toxicity.

FACILITY NAME's current permit includes Acute WET testing and monitoring requirements; the facility currently monitors WET and has had WET violations during the current permit cycle, **(ADD ADDITIONAL INFO IF NEEDED)**. Due to the potential presence of toxic compounds in the discharge, the draft permit will include WET monitoring and limits.

The *South Dakota WET Implementation Plan* was followed to determine the limits, sampling and monitoring frequency and types, dilution water, dilution series, hardness of the dilution water, test methods, test temperatures, and other WET testing procedures to use.

Add this wording if previous SOB has PASS/FAIL

SDDANR switched from a WET limit of Pass/Fail to Toxic Units (TU_a = Acute Toxic Units). One of the advantages to switching to TU_a is that it will allow labs, facilities, and SDDANR to use statistics to help eliminate false negatives, providing more accurate results. Therefore, in this permit cycle, the facility will be required to report in TU_a.

SOB - USE THIS PAGE FOR ACUTE WET TESTING FOR A PTD

(This is to be used in the corresponding sections of the SOB templates)

**Note – Permit writer may need to adjust the language as needed*

- *Permit Writers – If you deviate from either the RP or the WET documents you **MUST** explain why.*
- *Permit Writers – You may also need to alter the language below to fit your facility appropriately.*
- *Permit Writers – The paragraphs under SELF MONITORING can be combined into one if needed.*

EFFLUENT LIMITS

12. Acute Toxicity, as measured by the Whole Effluent Toxicity (WET) test, shall be less than 1.0 toxic unit (TU_a). This is equivalent to LC50 >100%. This limit is based on the SDSWQS (ARSD, Section 74:51:01:12), the *South Dakota WET Implementation Plan*, and permit writer's judgment.

SELF MONITORING REQUIREMENTS

The SDDANR *Reasonable Potential Implementation Procedure for SWD Permits* was reviewed to determine if WET testing is applicable to **FACILITY NAME**. Following the guidance document, **FACILITY NAME** has reasonable potential to cause or contribute to an exceedance of the SDSWQS for toxicity.

FACILITY NAME's current permit includes Acute WET testing and monitoring requirements; the facility currently monitors WET and has had WET violations during the current permit cycle, **(ADD ADDITIONAL INFO IF NEEDED)**. Due to the potential presence of toxic compounds in the discharge, the draft permit will include WET monitoring and limits.

The *South Dakota WET Implementation Plan* was followed to determine the limits, sampling and monitoring frequency and types, dilution water, dilution series, hardness of the dilution water, test methods, test temperatures, and other WET testing procedures to use.

This document also was followed to help determine that due to the intermittent discharging nature of this facility, the permittee shall sample and test for Acute WET before any discharge occurs in accordance with the draft permit. If toxicity occurs, the facility shall not discharge. If a discharge lasts longer than three months, an acute WET test must be performed on a **monthly/quarterly** basis.

Add this wording if previous SOB has PASS/FAIL

SDDANR switched from a WET limit of Pass/Fail to Toxic Units (TU_a = Acute Toxic Units). One of the advantages to switching to TU_a is that it will allow labs, facilities, and SDDANR to use statistics to help eliminate false negatives, providing more accurate results. Therefore, in this permit cycle, the facility will be required to report in TU_a.

SOB - USE THIS PAGE FOR ACUTE WET TESTING – NO DISCHARGE

(This is to be used in the corresponding sections of the SOB templates)

**Note – Permit writer may need to adjust the language as needed*

- *Permit Writers – If you deviate from either the RP or the WET documents you **MUST** explain why.*
- *Permit Writers – You may also need to alter the language below to fit your facility appropriately.*
- *Permit Writers – The paragraphs under SELF MONITORING can be combined into one if needed.*

SELF MONITORING REQUIREMENTS

The SDDANR *Reasonable Potential Implementation Procedure for SWD Permits* was reviewed to determine if WET testing is applicable to **FACILITY NAME**. Following the guidance document, **FACILITY NAME** has reasonable potential to cause or contribute to an exceedance of the SDSWQS for toxicity.

CHOOSE A or B Depending if previous permit had WET testing

- (A) **FACILITY NAME's** current permit includes Acute WET testing and monitoring requirements; the facility currently monitors WET and has had WET violations during the current permit cycle, **(ADD ADDITIONAL INFO IF NEEDED)**. Due to the potential presence of toxic compounds in the discharge, the draft permit will include WET monitoring.
- (B) **FACILITY NAME's** draft permit includes Acute WET testing and monitoring requirements, **(ADD ADDITIONAL INFO IF NEEDED)**. Due to the potential presence of toxic compounds in the discharge, the draft permit will include WET monitoring.

The *South Dakota WET Implementation Plan* was followed to determine the limits, sampling and monitoring frequency and types, dilution water, dilution series, hardness of the dilution water, test methods, test temperatures, and other WET testing procedures to use.

This document also was followed to help determine that Acute WET testing is appropriate because a discharge from **FACILITY NAME's** facility will only occur in an emergency basis and is expected to be of short duration, therefore immediate toxicity effects are more likely to occur over chronic toxicity effects.

Add this wording if previous SOB has PASS/FAIL

SDDANR switched from a WET limit of Pass/Fail to Toxic Units (TU_a = Acute Toxic Units). One of the advantages to switching to TU_a is that it will allow labs, facilities, and SDDANR to use statistics to help eliminate false negatives, providing more accurate results. Therefore, in this permit cycle, the facility will be required to report in TU_a .

SOB - USE THIS PAGE FOR SOB's WITH CHRONIC WET TESTING

(This is to be used in the corresponding sections of the SOB templates)

**Note – Permit writer may need to adjust the language as needed*

- *Permit Writers – If you deviate from either the RP or the WET documents you **MUST** explain why.*
- *Permit Writers – You may also need to alter the language below to fit your facility appropriately.*
- *Permit Writers – The paragraphs under SELF MONITORING can be combined into one if needed.*

EFFLUENT LIMITS

12. There shall be no Chronic toxicity, as measured by the Whole Effluent Toxicity (WET) test. The results shall be reported in Chronic toxic units (TU_c), where TU_c=100/IC₂₅. The 25% inhibition concentration (IC₂₅) shall be calculated based on test organism survival and growth or survival and reproduction. Chronic toxicity occurs when the TU_c in the effluent is greater than or equal to the **LIMIT**. The Chronic WET limit shall be < **###** TU_c, which is equivalent to IC₂₅ > the specified dilution of effluent. This limit is based on the SDSWQS (ARSD Section 74:51:01:12), *South Dakota WET Implementation Plan*, and permit writer's judgement.

The *South Dakota Reasonable Potential Implementation Procedure for SWD Permits* was reviewed to **determine if WET** testing is applicable for FACILITY NAME. Following this **document, WET** limits were developed for FACILITY NAME based on *South Dakota's WET Implementation Plan*. Based on the ratio of the critical low flow **of RECEIVING WATER NAME** to **the** 80th percentile of the daily maximum flow **from FACILITY NAME**, it was determined that the ratio was <10:1, indicating that chronic WET limits need to be developed for the proposed permit. Below is a summary of the chronic WET limit development.

Month	7Q5/25 (cfs)	80th Percentile of Effluent Flow (cfs)	7Q5/25:80th Percentile Effluent Flow	IC ₂₅ (%)	TU _c

The IC₂₅ is computed using the following equation:

$$IC_{25} = \frac{80^{th} \text{ percentile effluent flow}}{\mathbf{7Q5/25} + 80^{th} \text{ percentile effluent flow}}$$

The previous permit had a Chronic WET limit of an IC₂₅ of **##%** which has a TU_c equivalent of **###**. **This will be the limit included in the draft permit in order to prevent backsliding.**

In addition, for all Chronic tests, at any effluent dilutions, there shall be no Acute toxicity (LC₅₀). This is not a separate Acute WET test unless specified in the permit, but an analysis that is conducted based on daily observations as outlined in the current version of the "*Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*," 4th Edition, October 2002 (as allowed by Sections 11.1.2 for Method 1000.0 and 13.1.2 for Method 1002.0).

The Acute WET limit shall be <1.0 TU_a, which is equivalent to LC₅₀ at any dilution of effluent.

Acute test failure is defined as mortality to 50% or more of the test organisms at any dilution effluent or $\geq 1.0 \text{ TU}_a$. The effluent value must be $< 1.0 \text{ TU}_a$ to indicate a passing test. Any effluent value $\geq 1.0 \text{ TU}_a$ will constitute a failure.

SELF-MONITORING REQUIREMENTS

The SDDANR *Reasonable Potential Implementation Procedure for SWD Permits* was reviewed to determine if WET testing is applicable to **FACILITY NAME**. Following the guidance document, **FACILITY NAME** has reasonable potential to cause or contribute to an exceedance of the SDSWQS for toxicity.

FACILITY NAME's current permit includes Chronic WET testing and monitoring requirements; the facility currently monitors WET and **had WET violations** during the current permit cycle, **(ADD ADDITIONAL INFO IF NEEDED)**. Due to the potential presence of toxic compounds in the discharge, the draft permit will include WET monitoring and limits.

The *South Dakota WET Implementation Plan* was followed to determine the limits, sampling & monitoring frequency and types, dilution water, dilution series, hardness of the dilution water, test methods and temperatures, IC_{25} concentrations in TU_c , and other WET testing procedures to use.

Add this wording if previous SOB has WET IC_{25}

SDDANR switched from a WET limit of IC_{25} concentration to Toxic Units ($\text{TU}_c = \text{Chronic Toxic Units}$). The TU_c can be calculated from the IC_{25} using the following equation: $\text{TU}_c = 100/\text{IC}_{25}$. One of the advantages to switching to TU_c 's is that it will allow labs, facilities, and SDDANR to use statistics to help eliminate false negatives, providing more accurate results. Therefore, chronic WET results shall be reported as TU_c .

PERMIT - ALL WET DEFINITIONS LISTED BELOW MUST BE IN ALL PERMITS

(This is to be used in the DEFINITIONS section of templates)

DEFINITIONS

“Acute Toxicity” occurs when, in the LC₅₀ test, 50 percent or more mortality is observed for either species at any effluent concentration which is equivalent to ≥ 1.0 TU_a. Mortality in the control must simultaneously be 10 percent or less for the effluent results to be considered valid.

“Chronic Toxicity” occurs when, in the IC₂₅ test, the survival, growth, or reproduction, as applicable, for either test species, at the effluent dilution(s) designated in this permit, is significantly less (at the 95 percent confidence level) than that observed for the control specimens.

“Inhibition Concentration, 25 Percent (IC₂₅)” is a point estimate of the toxicant concentration that would cause a 25-percent reduction in a biological measurement (e.g., reproduction, growth), calculated from a continuous model (i.e., Interpolation Method).

“Instream Waste Concentration (IWC)” is the concentration of a toxicant in the receiving water after mixing. It is also referred to as the receiving water concentration (RWC).

“Lethal Concentration, 50 Percent (LC₅₀)” is the toxic or effluent concentration that would cause mortality in 50 percent of the test organisms over a specified period of time.

“Mixing Zone (Zone of mixing)” is an area in a stream where an effluent or discharge mixes with the upstream water under ARSD 74:51:01:01. A mixing zone for wastewater discharges to flowing waters is allowed under ARSD 74:51:01:26. Lakes are not allowed a mixing zone under ARSD 74:51:01:27.

“No Observed Effect Concentration (NOEC)” is the highest tested concentration of an effluent or a toxicant that causes no observable adverse effect on the test species (i.e., the highest concentration of toxicant at which the values for the observed responses are not statistically different from the controls). NOEC is determined using hypothesis testing.

“PTI” means Preliminary Toxicity Investigation. Up to a 30-day period where the permittee investigates the cause(s) of a whole effluent toxicity exceedance and if the toxicity is known, includes a proposal for its elimination.

“Reasonable Potential (RP)” is the likelihood that an effluent will cause or contribute to an excursion above a water quality standard based on a number of factors, including the use of data (e.g., whole effluent toxicity test data). In the context of this document, references to RP and WET limits include both lethal and sub-lethal effects.

“Surface Water Discharge (SWD) Permitting Program” is the state program that regulates the discharge of pollutants into the state’s waters. This is the state’s implementation of the federal NPDES program.

“Test Acceptability Criteria (TAC)” are specific criteria for determining whether toxicity test results are acceptable, pursuant to EPA’s WET test methods in 40 CFR 136 (additional TAC may be established by the Department). The effluent and reference toxicant must meet specific criteria as defined in the test method.

“Toxic Unit - Acute (TU_a)” is 100 times the reciprocal of the effluent concentration that causes 50 percent of the organisms to die in an acute toxicity test ($TU_a = 100/LC_{50}$) (see LC_{50}).

“Toxic Unit - Chronic (TU_c)” is 100 times the reciprocal of the effluent concentration that causes no observable effect on the test organisms in a chronic toxicity test ($TU_c = 100/IC_{25}$).

“Toxicity Identification Evaluation (TIE)” is a set of site-specific procedures used to identify the specific chemical(s) causing effluent toxicity.

“Toxicity Reduction Evaluation (TRE)” is a site-specific study conducted in a stepwise process to identify the causative agents of effluent toxicity, isolate the source of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity after the control measures are put in place.

“Whole Effluent Toxicity (WET)” is the total toxic effect of an effluent measured directly with a toxicity test.

“Whole Effluent Toxicity (WET) Test” is a procedure using living organisms to determine whether a chemical or an effluent is toxic. A toxicity test measures the degree of the effect of a specific chemical or effluent on exposed test organisms.

PERMIT - USE THIS REOPENER LANGUAGE WHEN WET MONITORING AND/OR A LIMIT IS NOT IN THE PERMIT

(This is to be used in the REOPENER PROVISIONS section 2.2 of Template)

Toxicity Limit - Reopener Provision

6. Whole Effluent Toxicity: Whole effluent toxicity is detected in the discharge; this permit may be reopened and modified (following proper administrative procedures) to include whole effluent toxicity (WET) testing, a WET limit, a compliance date, additional or modified numerical limits, or any other conditions related to the control of toxicants if toxicity is detected during the life of this permit.

PERMIT - USE THIS REOPENER LANGUAGE IN THE PERMIT WHEN ANY TOXICITY LIMIT IS IN THE PERMIT

(This is to be used in the REOPENER PROVISIONS section 2.2 of Template)

Toxicity Limit - Reopener Provision.

7. Whole Effluent Toxicity: This permit may be reopened and modified (following proper administrative procedures) to include, whole effluent toxicity (WET) limits, a compliance date, a compliance schedule, a change in the whole effluent toxicity protocol, additional or modified numerical limitations, or any other conditions related to the control of toxicants if one or more of the following events occur:
 - a. Toxicity was detected late in the life of the permit near or past the deadline for compliance.
 - b. The TRE results indicate that compliance with the toxic limits will require an implementation schedule past the date for compliance and the Department agrees with the conclusion.
 - c. The TRE results indicate that the toxicant(s) represent pollutant(s) that may be controlled with specific numerical limits, and the Department agrees that numerical controls are the most appropriate course of action.
 - d. Following the implementation of numerical control(s) of toxicant(s), the Department agrees that a modified whole effluent toxicity protocol is necessary to compensate for those toxicants that are controlled numerically.
 - e. The TIE/TRE reveals other unique conditions or characteristics which, in the opinion of the Department, justify the incorporation of unanticipated special conditions in the permit.

PERMIT - USE THIS REOPENER LANGUAGE ONLY WHEN THERE IS ACUTE TOXICITY MONITORING AND/OR WET LIMIT IN THE PERMIT

(This is to be used in the REOPENER PROVISIONS section 2.2 of Template)

8. Chronic Whole Effluent Toxicity: To include chronic whole effluent toxicity limits if any other information or data are developed indicating that chronic whole effluent toxicity limits are needed. If acceptable to the Department, and if in compliance with current regulations, this permit may be reopened and modified to incorporate TIE/TRE conclusion relating to additional numerical limits, a modified compliance schedule, and or modified whole effluent protocol.

PERMIT - USE THIS PAGE FOR ACUTE WET – CONTINUOUS DISCHARGER

(This is to be used in the EFFLUENT LIMITS section 3.## of Template)

3.## WHOLE EFFLUENT TOXICITY TESTING – ACUTE TOXICITY

1. Whole Effluent Toxicity (WET) Testing - Acute Toxicity

Upon the effective date of this permit, the permittee shall, at least once each **month/quarter** conduct Acute toxicity tests on a **grab/24-hour composite** sample of the final effluent. Samples shall be collected on a two-day progression (i.e., if the first sample is on a Monday, during the next sampling period, the sampling shall begin on a Wednesday, etc.).

The Department recommends sampling be completed at the beginning of the monitoring period (i.e., if quarterly monitoring, within the first two months of the quarter), thus reserving time for complications (i.e., invalid tests, weather, etc.). Any repeated tests must be started in the same monitoring period. Failure to obtain a valid test will be considered a failure to sample and is a violation of this permit. All sample(s) shall be collected at the outfall(s) as specified in this permit.

Dilution water shall be standard laboratory (reconstituted) with the general characteristics of **very soft, soft, moderately hard, hard, or very hard** water. This permit does not allow a mixing zone for Acute WET; therefore, IWCs are set at 100% effluent at the end of pipe. The dilution series shall include at least 5 effluent dilutions and a control. The dilution series for this permit is **100%, 50%, 25%, 12.5%, 6.25%, and a Control**.

The Acute static non-renewal and renewal (with renewals every 48 hours) toxicity tests; including the dilution water, reference (control) toxicant and effluent sample shall be conducted in accordance with the procedures, test conditions, and Test Acceptability Criteria (TAC) as set out in the latest revision of “*Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*,” Fifth Edition, October 2002, (EPA-821-R-02-012, Table IA, 40 CFR 136).

The permittee shall conduct the Acute 48-hour static non-renewal toxicity test using *Ceriodaphnia dubia* (water flea) using the Acute Toxicity Test Method 2002.0 and the Acute 96-hour static renewal (with renewals every 48 hours) toxicity test using *Pimephales promelas* (fathead minnow) using Acute Toxicity Test Method 2000.0. The above tests shall be conducted at **20° C, 25° C**.

The use of alternate testing procedures or methods shall be approved in advance by the Department (including, but not limited to the use of EDTA, CO₂ overlay, chlorine removal from the effluent sample if the effluent is chlorinated, etc.).

The Acute WET limit is <1.0 TU_a, which is equivalent to LC₅₀ >100% effluent. Acute test failure is defined as mortality to 50% or more of the test organisms at any effluent dilution. The effluent value must be < 1.0 TU_a to indicate a passing test. Any value ≥ 1.0 TU_a will constitute a failure. The results shall be reported in TU_a, where TU_a = 100/LC₅₀. This permit has additional requirements if any sample is found to be acutely toxic [**See Sections: 3.## (2), (3), (4), and (5)**].

WET test data results shall be summarized on the latest revision of the “Region 8 Acute Toxicity Test Report Form”, complete lab data packet and the chain of custody shall be submitted along with the completed Discharge Monitoring Report (DMR) for the end of the calendar period during which the whole effluent toxicity test was conducted.

If the results of a total of 24 consecutive WET tests (12 tests using *Ceriodaphnia dubia* and 12 *Pimephales promelas*) indicate no Acute toxicity, the permittee may request in writing to the Department to allow a reduction to quarterly Acute toxicity testing of alternating quarters. The Department may approve or deny the request based on the results and other available information without additional public notice. If the request is approved, the test procedures are to be the same as specified above for the test species.

PERMIT - USE THIS PAGE FOR ACUTE WET – INTERMITTENT DISCHARGER

(This is to be used in the EFFLUENT LIMITS section 3.## of Template)

3.## WHOLE EFFLUENT TOXICITY TESTING – ACUTE TOXICITY

a. Whole Effluent Toxicity (WET) Testing - Acute Toxicity

Upon the effective date of this permit, the permittee shall, at least once each **quarter**, during which a discharge occurs, conduct Acute toxicity tests on a **grab** sample of the final effluent. Samples shall be collected on a two-day progression (i.e., if the first sample is on a Monday, during the next sampling period, the sampling shall begin on a Wednesday, etc.). If a single, continuous discharge occurs over two calendar quarters, and has a duration less than or equal to 90 days, then only one WET test is required for that discharge.

The Department recommends sampling be completed at the beginning of the monitoring period (i.e., if quarterly monitoring, within the first two months of the quarter), thus reserving time for complications (i.e., invalid tests, weather, etc.). Any repeated tests must be started in the same monitoring period. Failure to obtain a valid test will be considered a failure to sample and is a violation of this permit. All sample(s) shall be collected at the outfall(s) as specified in this permit.

Dilution water shall be standard laboratory (reconstituted) with the general characteristics of **very soft, soft, moderately hard, hard, or very hard** water. This permit does not allow a mixing zone for Acute WET; therefore, IWCs are set at 100% effluent at the end of pipe. The dilution series shall include at least 5 effluent dilutions and a control. The dilution series for this permit is **100%, 50%, 25%, 12.5%, 6.25%, and a Control**.

The Acute static non-renewal and renewal (with renewals every 48 hours) toxicity tests; including the dilution water, reference (control) toxicant and effluent sample shall be conducted in accordance with the procedures, test conditions, and Test Acceptability Criteria (TAC) as set out in the latest revision of “*Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*,” Fifth Edition, October 2002, (EPA-821-R-02-012, Table IA, 40 CFR 136).

The permittee shall conduct the Acute 48-hour static non-renewal toxicity test using *Ceriodaphnia dubia* (water flea) using the Acute Toxicity Test Method 2002.0 and the Acute 96-hour static renewal (with renewals every 48 hours) toxicity test using *Pimephales promelas* (fathead minnow) using Acute Toxicity Test Method 2000.0. The above tests shall be conducted at **20° C, 25° C**.

The use of alternate testing procedures or methods shall be approved in advance by the Department (including, but not limited to the use of EDTA, CO₂ overlay, chlorine removal from the effluent sample if the effluent is chlorinated, etc.).

The Acute WET limit is <1.0 TU_a, which is equivalent to LC₅₀ >100% effluent. Acute test failure is defined as mortality to 50% or more of the test organisms at any effluent dilution. The effluent value must be < 1.0 TU_a to indicate a passing test. Any value ≥ 1.0 TU_a will constitute a failure. The results shall be reported in TU_a, where TU_a = 100/LC₅₀. This permit has additional requirements if any sample is found to be acutely toxic [**See Sections: 3.## (2), (3), (4), and (5)**].

WET test data results shall be summarized on the latest revision of the “Region 8 Acute Toxicity Test Report Form”, complete lab data packet and the chain of custody shall be submitted along with the completed Discharge Monitoring Report (DMR) for the end of the calendar period during which the whole effluent toxicity test was conducted.

If the results of a total of 24 consecutive WET tests (12 tests using *Ceriodaphnia dubia* and 12 *Pimephales promelas*) indicate no Acute toxicity, the permittee may request in writing to the Department to allow a reduction to quarterly Acute toxicity testing of alternating quarters. The Department may approve or deny the request based on the results and other available information without additional public notice. If the request is approved, the test procedures are to be the same as specified above for the test species.

PERMIT - USE THIS PAGE FOR ACUTE WET – IF IN ONLY THE PTD SAMPLE

(This is to be used in the EFFLUENT LIMITS section 3.## of Template)

3.## WHOLE EFFLUENT TOXICITY TESTING – ACUTE TOXICITY

a. Whole Effluent Toxicity (WET) Testing - Acute Toxicity

Upon the effective date of this permit, the permittee shall, at least once prior to each discharge, conduct an Acute toxicity tests on a **grab** sample from each cell from which it will discharge. If the discharge is three months or longer quarterly WET tests shall be conducted. If a single, continuous discharge occurs over two calendar quarters, and has a duration less than or equal to 90 days, then only one WET test is required for that discharge.

The Department recommends sampling be completed at the beginning of the monitoring period (i.e., if quarterly monitoring, within the first two months of the quarter), thus reserving time for complications (i.e., invalid tests, weather, etc.). Any repeated tests must be started in the same monitoring period. Failure to obtain a valid test will be considered a failure to sample and is a violation of this permit. All sample(s) shall be collected at the outfall(s) as specified in this permit.

Dilution water shall be standard laboratory (reconstituted) with the general characteristics of **very soft, soft, moderately hard, hard, or very hard** water. This permit does not allow a mixing zone for Acute WET; therefore, IWCs are set at 100% effluent at the end of pipe. The dilution series shall include at least 5 effluent dilutions and a control. The dilution series for this permit is **100%, 50%, 25%, 12.5%, 6.25%, and a Control**.

The Acute static non-renewal and renewal (with renewals every 48 hours) toxicity tests; including the dilution water, reference (control) toxicant and effluent sample shall be conducted in accordance with the procedures, test conditions, and Test Acceptability Criteria (TAC) as set out in the latest revision of “*Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*,” Fifth Edition, October 2002, (EPA-821-R-02-012, Table IA, 40 CFR 136).

The permittee shall conduct the Acute 48-hour static non-renewal toxicity test using *Ceriodaphnia dubia* (water flea) using the Acute Toxicity Test Method 2002.0 and the Acute 96-hour static renewal (with renewals every 48 hours) toxicity test using *Pimephales promelas* (fathead minnow) using Acute Toxicity Test Method 2000.0. The above tests shall be conducted at **20° C, 25° C**.

The use of alternate testing procedures or methods shall be approved in advance by the Department (including, but not limited to the use of EDTA, CO₂ overlay, chlorine removal from the effluent sample if the effluent is chlorinated, etc.).

The Acute WET limit is <1.0 TU_a, which is equivalent to LC₅₀ >100% effluent. Acute test failure is defined as mortality to 50% or more of the test organisms at any effluent dilution. The effluent value must be < 1.0 TU_a to indicate a passing test. Any value ≥ 1.0 TU_a will constitute a failure. The results shall be reported in TU_a, where TU_a = 100/LC₅₀. This permit has additional requirements if any sample is found to be acutely toxic [**See Sections: 3.## (2), (3), (4), and (5)**].

WET test data results shall be summarized on the latest revision of the “Region 8 Acute Toxicity Test Report Form”, complete lab data packet and the chain of custody shall be submitted along with the completed Discharge Monitoring Report (DMR) for the end of the calendar period during which the whole effluent toxicity test was conducted.

If the results of a total of 24 consecutive WET tests (12 tests using *Ceriodaphnia dubia* and 12 *Pimephales promelas*) indicate no Acute toxicity, the permittee may request in writing to the Department to allow a reduction to quarterly Acute toxicity testing of alternating quarters. The Department may approve or deny the request based on the results and other available information without additional public notice. If the request is approved, the test procedures are to be the same as specified above for the test species.

PERMIT - USE THIS PAGE IF INCLUDING ACUTE WET – ND FACILITY

(This is to be used in the *EFFLUENT LIMITS* section 3.## of Template)

3.## WHOLE EFFLUENT TOXICITY TESTING – ACUTE TOXICITY

a. Whole Effluent Toxicity (WET) Testing - Acute Toxicity

Upon the effective date of this permit, the permittee shall, at least once per discharge, conduct an Acute toxicity tests on a **grab** sample of the discharge.

The Department recommends sampling be completed at the beginning of the monitoring period (i.e., if an emergency discharge, the first day other parameters are sampled), thus reserving time for complications (i.e., invalid tests, weather, etc.). Any repeated tests must be completed in the same monitoring period. Failure to obtain a valid test will be considered a failure to sample and is a violation of this permit. All sample(s) shall be collected at the outfall(s) or location of the discharge as specified in this permit.

Dilution water shall be standard laboratory (reconstituted) with the general characteristics of **very soft, soft, moderately hard, hard, or very hard** water. This permit does not allow a mixing zone for Acute WET; therefore, IWCs are set at 100% effluent at the end of pipe. The dilution series shall include at least 5 effluent dilutions and a control. The dilution series for this permit is **100%, 50%, 25%, 12.5%, 6.25%, and a Control**.

The Acute static non-renewal and renewal (with renewals every 48 hours) toxicity tests; including the dilution water, reference (control) toxicant and effluent sample shall be conducted in accordance with the procedures, test conditions, and Test Acceptability Criteria (TAC) as set out in the latest revision of “*Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*,” Fifth Edition, October 2002, (EPA-821-R-02-012, Table IA, 40 CFR 136).

The permittee shall conduct the Acute 48-hour static non-renewal toxicity test using *Ceriodaphnia dubia* (water flea) using the Acute Toxicity Test Method 2002.0 and the Acute 96-hour static renewal (with renewals every 48 hours) toxicity test using *Pimephales promelas* (fathead minnow) using Acute Toxicity Test Method 2000.0. The above tests shall be conducted at **20° C, 25° C**.

The use of alternate testing procedures or methods shall be approved in advance by the Department (including, but not limited to the use of EDTA, CO₂ overlay, chlorine removal from the effluent sample if the effluent is chlorinated, etc.).

The Acute WET limit is <1.0 TU_a, which is equivalent to LC₅₀ >100% effluent. Acute test failure is defined as mortality to 50% or more of the test organisms at any effluent dilution. The effluent value must be < 1.0 TU_a to indicate a passing test. Any value ≥ 1.0 TU_a will constitute a failure. The results shall be reported in TU_a, where TU_a = 100/LC₅₀. This permit has additional requirements if any sample is found to be acutely toxic [**See Sections: 3.## (2), (3), (4), and (5)**].

WET test data results shall be summarized on the latest revision of the “Region 8 Acute Toxicity Test Report Form”, complete lab data packet and the chain of custody shall be submitted along with the completed Discharge Monitoring Report (DMR) for the end of the calendar period during which the whole effluent toxicity test was conducted.

PERMIT - USE THIS PAGE FOR CHRONIC WET – CONTINUOUS DISCHARGER

(This is to be used in the EFFLUENT LIMITS section 3.## of Template)

3.## WHOLE EFFLUENT TOXICITY TESTING – CHRONIC TOXICITY

a. Whole Effluent Toxicity (WET) Testing - Chronic Toxicity

Upon the effective date of this permit, the permittee shall, at least once each **month/quarter** conduct chronic static renewal (with renewals every 24 hours) toxicity tests on a **24-hour composite** sample of the final effluent. The samples shall be collected on days 1, 3 and 5.

The Department recommends sampling be completed at the beginning of the monitoring period (i.e., if quarterly monitoring, the first two months of the quarter), thus reserving time for complications (i.e., invalid tests, weather, etc.). Any repeated tests must be started in the same monitoring period. Failure to obtain a valid test will be considered a failure to sample and is a violation of this permit. All sample(s) shall be collected at the outfall(s) as specified in this permit.

Dilution water shall be standard laboratory (reconstituted) with the general characteristics of **very soft, soft, moderately hard, hard, or very hard** water. The dilution series shall include at least 5 effluent dilutions which include and bracket the instream waste concentration (IWC) and a control. This permit authorizes a mixing zone; therefore, the Chronic IWCs for this permit are **XXX%** effluent and **YYY%** effluent. The dilution series for this permit are: **(1) 100%, (2) (IWC + 100)/2, (3) IWC, (4) IWC/2, and (5) IWC/4, and Control.**

INSERT DILUTION SERIES TABLE HERE IF NEEDED (MONTH, TU_c, IWC%, DILUTION SERIES - SEE AGROPUR)

The 7-day Chronic static renewal (with renewals every 24 hours) toxicity tests; including the dilution water, reference (control) toxicant and effluent sample shall be conducted in accordance with the procedures, test conditions, and Test Acceptability Criteria (TAC) as set out in the latest revision of “*Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*,” Fourth Edition, October 2002, (EPA-821-R-02-013, Table IA, 40 CFR 136).

The permittee shall conduct the Chronic 7-day static renewal (with renewals every 24 hours) toxicity test using *Ceriodaphnia dubia* (water flea) using the Chronic Toxicity Test Method 1002.0 and *Pimephales promelas* (fathead minnow) using Chronic Toxicity Test Method 1000.0. The above tests shall be conducted at 25° C.

The Chronic WET limit is ## TU_c, which is equivalent to IC₂₅ ## % effluent. Chronic toxicity occurs when the toxicant concentration causes a 25-percent reduction in a biological measurement (e.g., survival and reproduction or survival and growth), calculated from a continuous model (i.e. Interpolation Method). The effluent value must be less than (<) the TU_c limit to indicate a passing test. Any value greater than or equal to (≥) the TU_c limit will constitute a failure. The results shall be reported in TU_c, where TU_c = 100/IC₂₅. This permit has additional requirements if any sample is found to be chronically toxic **[See Sections: 3.## (2), (3), (4), and (5)].**

In addition, there shall be no Acute toxicity (LC₅₀) at any effluent dilution as outlined in the current version of the Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, 4th Edition, October 2002 (as allowed by Sections 11.1.2 for Method 1000.0 and 13.1.2 for Method 1002.0).

The Acute WET limit is <1.0 TU_a, which is equivalent to LC₅₀ >100% effluent. Acute toxicity is defined as mortality to 50% or more of the test organisms at any effluent dilution. The effluent value must be < 1.0 TU_a to indicate a passing test. Any value ≥ 1.0 TU_a will constitute a failure. The results shall be reported in TU_a, where TU_a = 100/LC₅₀. This permit has additional requirements if any sample is found to be acutely toxic **[See Sections: 3.## (2), (3), (4), and (5)].**

The use of alternate testing procedures or methods shall be approved in advance by the Department (including, but not limited to the use of EDTA, CO₂ overlay, chlorine removal from the effluent sample if the effluent is chlorinated, etc.).

WET test data results shall be summarized on the latest revision of the “Region 8 Chronic Toxicity Test Report Form”, complete lab data packet and the chain of custody shall be submitted along with the completed Discharge Monitoring Report (DMR) for the end of the calendar period during which the whole effluent toxicity test was conducted.

If the results of a total of 24 consecutive WET tests (12 tests using *Ceriodaphnia dubia* and 12 *Pimephales promelas*) indicate no Chronic or Acute toxicity, the permittee may request in writing to the Department to allow a reduction to quarterly Chronic toxicity testing of alternating quarters. The Department may approve or deny the request based on the results and other available information without additional public notice. If the request is approved, the test procedures are to be the same as specified above for the test species.

PERMIT - USE THIS PAGE FOR CHRONIC WET – INTERMITTENT DISCHARGER

(This is to be used in the EFFLUENT LIMITS section 3.## of Template)

3.## WHOLE EFFLUENT TOXICITY TESTING – CHRONIC TOXICITY

a. Whole Effluent Toxicity (WET) Testing - Chronic Toxicity

Upon the effective date of this permit, the permittee shall, at least once each **quarter**, during which a discharge occurs, conduct chronic static renewal (with renewals every 24 hours) toxicity tests on a **grab** sample of the final effluent. Three samples shall be collected on days 1, 3 and 5. If a single, continuous discharge occurs over two calendar quarters, and has a duration less than or equal to 90 days, then only one WET test is required for that discharge.

The Department recommends sampling be completed at the beginning of the monitoring period (i.e., if quarterly monitoring, the first two months of the quarter), thus reserving time for complications (i.e., invalid tests, weather, etc.). Any repeated tests must be started in the same monitoring period. Failure to obtain a valid test will be considered a failure to sample and is a violation of this permit. All sample(s) shall be collected at the outfall(s) as specified in this permit.

Dilution water shall be standard laboratory (reconstituted) with the general characteristics of **very soft, soft, moderately hard, hard, or very hard** water. The dilution series shall include at least 5 effluent dilutions which include and bracket the instream waste concentration (IWC) and a control. This permit authorizes a mixing zone; therefore, the Chronic IWCs for this permit are **XXX%** effluent and **YYY%** effluent. The dilution series for this permit are (1) 100%, (2) $(IWC + 100)/2$, (3) IWC, (4) $IWC/2$, and (5) $IWC/4$, and Control.

INSERT DILUTION SERIES TABLE HERE IF NEEDED (MONTH, IWC%, DILUTION SERIES - SEE AGROPUR)

The 7-day Chronic static renewal (with renewals every 24 hours) toxicity tests; including the dilution water, reference (control) toxicant and effluent sample shall be conducted in accordance with the procedures, test conditions, and Test Acceptability Criteria (TAC) as set out in the latest revision of “*Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*,” Fourth Edition, October 2002, (EPA-821-R-02-013, Table IA, 40 CFR 136).

The permittee shall conduct the Chronic 7-day static renewal (with renewals every 24 hours) toxicity test using *Ceriodaphnia dubia* (water flea) using the Chronic Toxicity Test Method 1002.0 and *Pimephales promelas* (fathead minnow) using Chronic Toxicity Test Method 1000.0. The above tests shall be conducted at 25° C.

The Chronic WET limit is ## TU_c, which is equivalent to IC₂₅ ## % effluent. Chronic toxicity occurs when the toxicant concentration causes a 25-percent reduction in a biological measurement (e.g., survival and reproduction or survival and growth), calculated from a continuous model (i.e., Interpolation Method). The effluent value must be less than (<) the TU_c limit to indicate a passing test. Any value greater than or equal to (≥) the TU_c limit will constitute a failure. The results shall be reported in TU_c, where $TU_c = 100/IC_{25}$. This permit has additional requirements if any sample is found to be chronically toxic **[See Sections: 3.## (2), (3), (4), and (5)].**

In addition, there shall be no Acute toxicity (LC50) at any effluent dilution as outlined in the current version of the Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, 4th Edition, October 2002 (as allowed by Sections 11.1.2 for Method 1000.0 and 13.1.2 for Method 1002.0).

The Acute WET limit is <1.0 TU_a, which is equivalent to LC₅₀ >100% effluent. Acute toxicity is defined as mortality to 50% or more of the test organisms at any effluent dilution. The effluent value must be < 1.0 TU_a to indicate a passing test. Any value ≥ 1.0 TU_a will constitute a failure. The results shall be reported in TU_a, where $TU_a = 100/LC_{50}$. This permit has additional requirements if any sample is found to be acutely toxic **[See Sections: 3.## (2), (3), (4), and (5)].**

The use of alternate testing procedures or methods shall be approved in advance by the Department (including, but not limited to the use of EDTA, CO₂ overlay, chlorine removal from the effluent sample if the effluent is chlorinated, etc.).

WET test data results shall be summarized on the latest revision of the “Region 8 Chronic Toxicity Test Report Form”, complete lab data packet and the chain of custody shall be submitted along with the completed Discharge Monitoring Report (DMR) for the end of the calendar period during which the whole effluent toxicity test was conducted.

If the results of a total of 24 consecutive WET tests (12 tests using *Ceriodaphnia dubia* and 12 *Pimephales promelas*) indicate no Chronic or Acute toxicity, the permittee may request in writing to the Department to allow a reduction to quarterly Chronic toxicity testing of alternating quarters. The Department may approve or deny the request based on the results and other available information without additional public notice. If the request is approved, the test procedures are to be the same as specified above for the test species.

PERMIT - USE THIS LANGUAGE WHEN ACUTE OR CHRONIC WET MONITORING AND/OR WET LIMIT IS IN THE PERMIT

(This is to be used in conjunction with the WET TESTING sections 3.##1 (#) of Template)

2. Accelerated Testing

When the WET limit is exceeded during routine testing, the permittee shall perform an accelerated schedule of WET testing to establish whether a pattern of toxicity exists. There are two specific paths (KNOWN and UNKNOWN) for accelerated testing, and they are as follows:

- a. If a WET permit limit is exceeded and the source of the toxicity is **KNOWN** (e.g., a temporary plant upset, etc.), the facility shall immediately initiate a preliminary toxicity investigation (PTI). The permittee shall also conduct one additional toxicity test using the same species and test method that failed. **This test shall begin within 14 days of notification/receipt of the test results exceeding the permit limit.** If this additional accelerated test does not exceed WET permit limits, then the permittee may return to their regular testing frequency. If the additional accelerated test exceeds a WET permit limit, then there is a pattern of toxicity. The permittee must submit a TIE/TRE work plan with a timetable to eliminate the toxicity. This TIE/TRE work plan shall be considered part of the permit.
- b. If a WET permit limit is exceeded, and the source of the toxicity is **UNKNOWN**, the facility must immediately initiate a preliminary toxicity investigation (PTI). The permittee also must conduct accelerated testing that shall consist of 12 WET tests conducted at a maximum of 4-week intervals over a 12-month period using the same species and test method that failed. The Department reserves the right to increase the accelerated testing frequency to bi-weekly upon written notification to the permittee. **Accelerated testing shall begin within 14 days of notification/receipt of the test results exceeding the permit limit.** If none of the additional test exceeds WET permit limit(s), then the permittee may return to their regular testing frequency. If any of the accelerated tests exceed WET permit limit(s), then there is a pattern of toxicity. The permittee must submit a TIE/TRE work plan with a timetable to eliminate the toxicity. This TIE/TRE work plan shall be considered part of the permit.

3. Pattern of Toxicity

There is a pattern of toxicity if any one accelerated WET test exceeds the permit limit or is considered a failure pursuant to the accelerated testing requirements, using a full dilution series and the species found to be most sensitive. A pattern of toxicity may also be established based on all past toxicity failures using Best Professional Judgment (BPJ) (i.e., failed sample every spring, etc.). The establishment of a pattern of toxicity triggers a PTI and a TIE/TRE.

4. Preliminary Toxicity Investigations (PTI)

Any WET limit violation or an established pattern of toxicity requires the permittee to automatically begin an evaluation of the possible cause(s) of the toxicity. This is the permittees chance to find the cause of the toxicity and make a proposal for its elimination. A maximum of 30 days is allowed for this evaluation. This period may be extended if extenuating circumstances exist, and written approval is granted prior to exceeding 30 days. Close coordination and communication with the Department is also required. The results of this

investigation will aid in determining the need for further investigations, studies, TIE/TRE, permit modification, and/or enforcement action.

5. Toxicity Identification Evaluations (TIE) and Toxicity Reduction Evaluations (TRE)

If the PTI cannot determine the cause of the WET failures, then the permittee shall begin the formal TIE/TRE process. A TIE/TRE is done when toxicity is evident based on an established Pattern of Toxicity.

If the Department is requiring a TIE/TRE, the permittee shall be notified in writing. Once a TIE/TRE has begun, the permittee shall submit a TIE/TRE work plan to the Department within 30 days following the effective date of the TIE/TRE notification letter. The permittee shall also submit monthly progress reports that will be due by the 1st of every month until the TIE/TRE is closed. Once the TIE/TRE has begun, accelerated testing may cease.

The permittee shall use the most recent editions as guidance as set forth by EPA for the TIE/TRE process and procedures: Methods for Aquatic Toxicity Identification Evaluations, Phase 1, Toxicity Characterization Procedures (EPA/600/6-91/003); Phase 2, Toxicity Identification Procedures (EPA/600/R-92/080); Phase 3, Toxicity Confirmation Procedures (EPA/600/R-92/080); and Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents Phase 1 (EPA/600/6-91/005F).

If toxicity spontaneously disappears during the TIE phase, the Department may require the permittee to conduct additional accelerated testing to demonstrate that no pattern of toxicity remains. This shall follow the UNKNOWN toxicity path of accelerated testing. If no additional pattern of toxicity is demonstrated, the TIE/TRE will be closed, and normal WET testing shall resume.

TIE/TRE shall be reported on the DMRs for the species that the TIE/TRE is being conducted. If the facility is using NetDMR, NODI 3 shall be used, and TIE/TRE shall be typed in the comment section of the electronic DMR.

A numerical limit, compliance schedule, or an enforcement action may be subsequently imposed on the permittee based off the results of the TIE/TRE and shall be considered part of this permit. The TIE/TRE will not be considered closed until written notification has been received from the Department.

APPENDIX B

ACUTE AND CHRONIC TEST REPORTING FORMS – GENERIC EXAMPLES ONLY

(Forms are not part of the permit but **must** be sent to the facility with the permit.
The forms are designed to be filled out by the lab)

***Forms contain Macros and may have to be disabled to be emailed to the facility/lab. The Macro versions are available at: R:\Work\SWQ\NPDES\WET - Whole Effluent Toxicity\SD WET Implementation Plan**

- Cover Page
- Acute Toxicity Test Report Form
- Chronic Toxicity Test Report Form

Figure 1 Cover Page

Welcome to the EPA Region 8 WET Reporting Forms program

These forms are designed for National Pollutant Discharge Elimination System (NPDES) Whole Effluent Toxicity (WET) test reporting.

The acute and chronic forms (see tabs below) are for reporting all acute or chronic data. The data sheet contains species selections for all 40 CFR 136.6 WET test organisms approved by the EPA.

The parameters tab is utilized where drop-downs are included in the form. The form utilizes macros and is protected.



Figure 2 Acute Toxicity Test Report Form

ACUTE TOXICITY TEST REPORT FORMAT		LC50 @ 100% <input type="radio"/> PASS <input type="radio"/> FAIL
I. FACILITY INFORMATION & REQUIREMENTS		
PERMITTEE NAME <input style="width: 90%;" type="text"/>	NPDES PERMIT # <input style="width: 90%;" type="text"/>	
HAS THE PERMITTEE SUPPLIED A COPY OF THE NPDES PERMIT?	<input type="radio"/> yes <input type="radio"/> no	
IS THE PERMIT PROVIDED THE MOST CURRENT?	<input type="radio"/> yes <input type="radio"/> no	
WHAT IS THE EXPIRATION DATE OF THE PERMIT?	<input style="width: 90%;" type="text"/>	
ARE WET LIMITATIONS SPECIFIED IN THE PERMIT?	<input type="radio"/> yes <input type="radio"/> no	
IF YES, WHAT LIMITATIONS ARE SPECIFIED?	<input style="width: 90%;" type="text"/>	
WHAT IS THE RECEIVING WATER SPECIFIED IN THE PERMIT?	<input style="width: 90%;" type="text"/>	
SPECIES SPECIFIED IN PERMIT? (one data sheet for each species)	<input style="border-bottom: 1px solid black; border-top: 1px solid black;" type="text"/> ▼	
TEST TYPE(S) SPECIFIED IN PERMIT?	<input style="border-bottom: 1px solid black; border-top: 1px solid black;" type="text"/> ▼	
LENGTH OF TEST SPECIFIED IN PERMIT?	<input style="border-bottom: 1px solid black; border-top: 1px solid black;" type="text"/> ▼	
ARE MORE FREQUENT RENEWALS REQUIRED?	<input type="radio"/> yes <input type="radio"/> no	
IF YES, WHAT RENEWALS ARE SPECIFIED?	<input style="width: 90%;" type="text"/>	
TEST TEMPERATURE SPECIFIED?	<input style="border-bottom: 1px solid black; border-top: 1px solid black;" type="text"/> ▼	
IS DILUTION WATER SPECIFIED IN THE PERMIT?	<input type="radio"/> yes <input type="radio"/> no	
IF YES, WHAT TYPE OF WATER IS SPECIFIED AND HARDNESS?	<input style="border-bottom: 1px solid black; border-top: 1px solid black;" type="text"/> ▼	
IS A DILUTION SERIES SPECIFIED?	<input type="radio"/> yes <input type="radio"/> no	
SAMPLE TYPE SPECIFIED IN PERMIT?	<input type="radio"/> grab <input type="radio"/> composite <input type="radio"/> not specified	
II. LABORATORY SAMPLE INFORMATION UPON ARRIVAL & TEST INFORMATION		
SAMPLE COLLECTION DATE <input style="width: 90%;" type="text"/>	SAMPLE COLLECTION TIME <input style="width: 90%;" type="text"/>	
TEST DATE <input style="width: 90%;" type="text"/>	START & END TIMES <input style="width: 90%;" type="text"/>	
TEST DURATION PERFORMED?	<input style="border-bottom: 1px solid black; border-top: 1px solid black;" type="text"/> ▼	
TEST TYPE PERFORMED?	<input style="border-bottom: 1px solid black; border-top: 1px solid black;" type="text"/> ▼	
SAMPLE RECEIVED?	<input type="radio"/> grab <input type="radio"/> composite	
OUTFALL NUMBER OR LOCATION?	<input style="width: 90%;" type="text"/>	
TEMPERATURE °C <input style="width: 90%;" type="text"/>	HARDNESS mg/L CaCO ₃ <input style="width: 90%;" type="text"/>	
CONDUCTIVITY <input style="width: 90%;" type="text"/>	AMMONIA mg/l as N <input style="width: 90%;" type="text"/>	
TOTAL RESIDUAL Cl mg/l <input style="width: 90%;" type="text"/>	OTHER <input style="width: 90%;" type="text"/>	
D.O. <input style="width: 90%;" type="text"/>	OTHER <input style="width: 90%;" type="text"/>	

III. LABORATORY ALTERATIONS PRIOR TO TEST

WAS SAMPLE DECHLORINATED?	<input type="radio"/> yes	<input type="radio"/> no
IS DECHLORINATION AUTHORIZED IN PERMIT?	<input type="radio"/> yes	<input type="radio"/> no
DESCRIBE DECHLORINATION (if any)	<input type="text"/>	
WAS SAMPLE FILTERED?	<input type="radio"/> yes	<input type="radio"/> no
FILTER SIZE?	<input type="text"/>	
WAS pH ADJUSTED?	<input type="radio"/> yes	<input type="radio"/> no
IS pH ADJUSTMENT AUTHORIZED IN PERMIT?	<input type="radio"/> yes	<input type="radio"/> no
WAS RECEIVED SAMPLE AERATED?	<input type="radio"/> yes	<input type="radio"/> no
OTHER ADJUSTMENTS? (if any, describe)	<input type="text"/>	

IV. TEST ORGANISM INFORMATION

AGE OF ORGANISMS?	<input type="text"/>	
CULTURED IN-HOUSE OR FROM EXTERNAL SUPPLIER?	<input type="radio"/> internal culture	<input type="radio"/> external supplier
FROM INDIVIDUAL CULTURE OR MASS CULTURE?	<input type="radio"/> individual	<input type="radio"/> mass culture
HAS MONTHLY REFTOX MET CONTROL CHART PARAMETERS?	<input type="radio"/> yes	<input type="radio"/> no
DATE AND TIME OF MOST RECENT REFTOX TEST AND TEST RESULT?	<input type="text"/>	
HAVE ORGANISMS PERFORMED SUCCESSFULLY IN THE MONTHLY REFTOX?	<input type="radio"/> yes	<input type="radio"/> no

V. TEST SET-UP

IDENTIFY THE DILUENT (O ₁) CONTROL (receiving water recommended)	DILUTIONS USED: CONTROL	EFFLUENT ---	DILUENT 500 mL
<input type="text"/>	<input type="text"/> %	<input type="text"/> mL	<input type="text"/> mL
(if used) IDENTIFY THE SECONDARY (O ₂) CONTROL (MHRW recommended unless receiving water characteristics differ)	<input type="text"/> %	<input type="text"/> mL	<input type="text"/> mL
<input type="text"/>	<input type="text"/> %	<input type="text"/> mL	<input type="text"/> mL
<input type="text"/>	<input type="text"/> %	<input type="text"/> mL	<input type="text"/> mL
	100%	500 mL	---

VI. TEST RESULTS

SURVIVAL MEASUREMENTS							
DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
# AT START OF TEST ?							
# ALIVE AT 24 HOURS?							
# ALIVE AT 48 HOURS?							
PERCENT SURVIVAL							
TEMPERATURE MEASUREMENTS							
DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN TEMPERATURE IN °C							
D.O. MEASUREMENTS							
DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN D.O IN mg/L							
pH MEASUREMENTS							
DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN pH IN s.u							
CONDUCTIVITY MEASUREMENTS							
DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN IN mS/cm							
CO2 MEASUREMENTS (if used)							
DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN AS CALCULATED							

ORGANISM OBSERVATIONS: (e.g. health of the organisms, was prodding required to determine death, were organisms responding in an abnormal manner, etc.)

- 1 – All organisms dead
- 2 – Some organisms dead, living organisms alive required probe or visual to determine if alive, laying or resting on bottom of cup
- 3 – Organisms alive, swimming erratic or slow
- 4 – Organisms alive, slight difference in swimming or movement
- 5 – Organisms alive, moving in normal fashion, no noticeable affects

VII. DATA ANALYSIS

METHOD USED TO CALCULATE DATA ENDPOINTS?			
SOFTWARE USED TO PERFORM CALCULATIONS?			
HOW WERE ANY OUTLIERS REMOVED FROM CALCULATION? (describe)	<input type="radio"/> yes <input type="radio"/> no		
FINAL DATA CALCULATIONS			
48-HR LC50	<input style="width: 100%;" type="text"/> 48-hr TUa		
96-HR LC50	<input style="width: 100%;" type="text"/> 96-hr TUa		
DESCRIBE ANY DEVIATIONS FROM TEST METHODS OR APPROVED MODIFICATIONS ADMINISTERED (e.g. pH-overlay used and how administered, D.O. issues, aeration used-rate of bubbles per minute and duration, temperature issues, holding time issues, etc.)			
ANALYST(S)		QA OFFICER	

Figure 3 Chronic Toxicity Test Report Form

CHRONIC TOXICITY TEST REPORT FORMAT	
IWC= <input style="width: 50px; height: 20px;" type="text"/> <input checked="" type="radio"/> PASS <input type="radio"/> FAIL	
I. FACILITY INFORMATION & REQUIREMENTS	
PERMITTEE NAME	NPDES PERMIT #
<input style="width: 95%; height: 20px;" type="text"/>	<input style="width: 95%; height: 20px;" type="text"/>
HAS THE PERMITTEE SUPPLIED A COPY OF THE NPDES PERMIT?	<input type="radio"/> yes <input type="radio"/> no
IS THE PERMIT PROVIDED THE MOST CURRENT?	<input type="radio"/> yes <input type="radio"/> no
WHAT IS THE EXPIRATION DATE OF THE PERMIT?	<input style="width: 95%; height: 20px;" type="text"/>
ARE WET LIMITATIONS SPECIFIED IN THE PERMIT?	<input type="radio"/> yes <input type="radio"/> no
IF YES, WHAT LIMITATIONS ARE SPECIFIED?	<input style="width: 95%; height: 20px;" type="text"/>
WHAT IS THE RECEIVING WATER SPECIFIED IN THE PERMIT?	<input style="width: 95%; height: 20px;" type="text"/>
SPECIES SPECIFIED IN PERMIT? (one data sheet for each species)	<input style="width: 95%; height: 20px;" type="text"/> ▼
TEST TYPE(S) SPECIFIED IN PERMIT?	<input style="width: 95%; height: 20px;" type="text"/> ▼
LENGTH OF TEST SPECIFIED IN PERMIT?	<input style="width: 95%; height: 20px;" type="text"/> ▼
ARE MORE FREQUENT RENEWALS REQUIRED?	<input type="radio"/> yes <input type="radio"/> no
IF YES, WHAT RENEWALS ARE SPECIFIED?	<input style="width: 95%; height: 20px;" type="text"/>
TEST TEMPERATURE SPECIFIED?	<input style="width: 95%; height: 20px;" type="text"/> ▼
IS DILUTION WATER SPECIFIED IN THE PERMIT?	<input type="radio"/> yes <input type="radio"/> no
IF YES, WHAT TYPE OF WATER IS SPECIFIED?	<input style="width: 95%; height: 20px;" type="text"/> ▼
IS A DILUTION SERIES SPECIFIED?	<input type="radio"/> yes <input type="radio"/> no
SAMPLE TYPE SPECIFIED IN PERMIT?	<input type="radio"/> grabs <input type="radio"/> composite <input type="radio"/> not specified

II. LABORATORY SAMPLE INFORMATION UPON ARRIVAL & TEST INFORMATION

SAMPLE 1 COLLECTION DATE	<input type="text"/>	SAMPLE 1 COLLECTION TIME	<input type="text"/>
SAMPLE 2 COLLECTION DATE	<input type="text"/>	SAMPLE 2 COLLECTION TIME	<input type="text"/>
SAMPLE 3 COLLECTION DATE	<input type="text"/>	SAMPLE 3 COLLECTION TIME	<input type="text"/>
TEST DATE INTIATION	<input type="text"/>	START & END TIMES	<input type="text"/>

TEST DURATION PERFORMED?	<input type="text"/>
TEST TYPE PERFORMED?	<input type="text"/>
SAMPLE RECEIVED?	<input type="radio"/> grabs <input type="radio"/> composites
OUTFALL NUMBER OR LOCATION?	<input type="text"/>

SAMPLE 1

TEMPERATURE °C	<input type="text"/>	HARDNESS mg/L CaCO3	<input type="text"/>
CONDUCTIVITY	<input type="text"/>	AMMONIA mg/l as N	<input type="text"/>
TOTAL RESIDUAL Cl mg/l	<input type="text"/>	OTHER	<input type="text"/>
D.O.	<input type="text"/>	OTHER	<input type="text"/>

SAMPLE 2

TEMPERATURE °C	<input type="text"/>	HARDNESS mg/L CaCO3	<input type="text"/>
CONDUCTIVITY	<input type="text"/>	AMMONIA mg/l as N	<input type="text"/>
TOTAL RESIDUAL Cl mg/l	<input type="text"/>	OTHER	<input type="text"/>
D.O.	<input type="text"/>	OTHER	<input type="text"/>

SAMPLE 3

TEMPERATURE °C	<input type="text"/>	HARDNESS mg/L CaCO3	<input type="text"/>
CONDUCTIVITY	<input type="text"/>	AMMONIA mg/l as N	<input type="text"/>
TOTAL RESIDUAL Cl mg/l	<input type="text"/>	OTHER	<input type="text"/>
D.O.	<input type="text"/>	OTHER	<input type="text"/>

III. LABORATORY ALTERATIONS PRIOR TO TEST

WERE ANY SAMPLES DECHLORINATED?	<input type="radio"/> yes <input type="radio"/> no
IS DECHLORINATION AUTHORIZED IN PERMIT?	<input type="radio"/> yes <input type="radio"/> no
DESCRIBE DECHLORINATION (if any)	<input type="text"/>
WERE ANY SAMPLES FILTERED?	<input type="radio"/> yes <input type="radio"/> no
FILTER SIZE?	<input type="text"/>
WAS pH ADJUSTED?	<input type="radio"/> yes <input type="radio"/> no
IS pH ADJUSTMENT AUTHORIZED IN PERMIT?	<input type="radio"/> yes <input type="radio"/> no
WERE ANY SAMPLES AERATED?	<input type="radio"/> yes <input type="radio"/> no
OTHER ADJUSTMENTS? (if any, describe)	<input type="text"/>

IV. TEST ORGANISM INFORMATION

AGE OF ORGANISMS?	<input type="text"/>
CULTURED IN-HOUSE OR FROM EXTERNAL SUPPLIER?	<input type="radio"/> internal culture <input type="radio"/> external supplier
FROM INDIVIDUAL CULTURE OR MASS CULTURE?	<input type="radio"/> individual <input type="radio"/> mass culture
HAS MONTHLY REFTOX MET CONTROL CHART PARAMETERS?	<input type="radio"/> yes <input type="radio"/> no
DATE AND TIME OF MOST RECENT REF TOX TEST AND TEST RESULT?	<input type="text"/>
HAVE ORGANISMS PERFORMED SUCCESSFULLY IN THE MONTHLY REFTOX?	<input type="radio"/> yes <input type="radio"/> no

V. TEST SET-UP

IDENTIFY THE DILUENT (O ₁) CONTROL (receiving water recommended) (if used) IDENTIFY THE SECONDARY (O ₂) CONTROL (MHRW recommended unless receiving water characteristics differ)	DILUTIONS USED:		EFFLUENT		DILUENT	
	CONTROL		---		500 mL	
	<input type="text"/>	%	<input type="text"/>	mL	<input type="text"/>	mL
	<input type="text"/>	%	<input type="text"/>	mL	<input type="text"/>	mL
	<input type="text"/>	%	<input type="text"/>	mL	<input type="text"/>	mL
<input type="text"/>	%	<input type="text"/>	mL	<input type="text"/>	mL	
	100%		500 mL		---	

VI. TEST RESULTS

SURVIVAL MEASUREMENTS (Typically 4 reps are required for vertebrates, 10 reps for invertebrates)

REPLICATES	1	2	3	4	5	6	7	8	9	10
CONTROL	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
100	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

REPRODUCTION OR GROWTH MEASUREMENTS (Typically 4 reps are required for vertebrates, 10 reps for invertebrates)

REPLICATES	1	2	3	4	5	6	7	8	9	10
CONTROL	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
100	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

TEMPERATURE MEASUREMENTS (MAX/MIN for test period)

DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN TEMPERATURE IN °C	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

D.O. MEASUREMENTS

DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN D.O IN mg/L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

pH MEASUREMENTS

DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN pH IN s.u	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

CONDUCTIVITY MEASUREMENTS

DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN IN mS/cm	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

CO₂ MEASUREMENTS (if used)

DILUTIONS	O ₁	O ₂ (if used)	--%	--%	--%	--%	100%
MAX/MIN AS CALCULATED	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

ORGANISM OBSERVATIONS: (e.g. health of the organisms, was prodding required to determine death, were organisms responding in an abnormal manner, etc.)

- 1 – All organisms dead
- 2 – Some organisms dead, living organisms alive required probe or visual to determine if alive, laying or resting on bottom of cup
- 3 – Organisms alive, swimming erratic or slow
- 4 – Organisms alive, slight difference in swimming or movement
- 5 – Organisms alive, moving in normal fashion, no noticeable affects

VII. DATA ANALYSIS

METHOD USED TO CALCULATE DATA ENDPOINTS?

SOFTWARE USED TO PERFORM CALCULATIONS?

HOW WERE ANY OUTLIERS REMOVED FROM CALCULATION? (describe)

FINAL DATA CALCULATIONS - SURVIVAL

% DATA CALCULATION

TU_c CALCULATION

FINAL DATA CALCULATIONS - GROWTH OR REPRODUCTION

% DATA CALCULATION

TU_c CALCULATION

DESCRIBE ANY DEVIATIONS FROM TEST METHODS OR APPROVED MODIFICATIONS ADMINISTERED (e.g. pH-overlay used and how administered, D.O. issues, aeration used-rate of bubbles per minute and duration, temperature issues, holding time issues, etc.)

ANALYST(S)

QA OFFICER

APPENDIX C

LIST OF FIGURES

Figure 1 - WET Application Flow Chart

Figure 2 - Acute or Chronic Flow Chart

Figure 3 - WET Limit Violation/Failure Flow Chart

Figure 1
WET Application Flow Chart

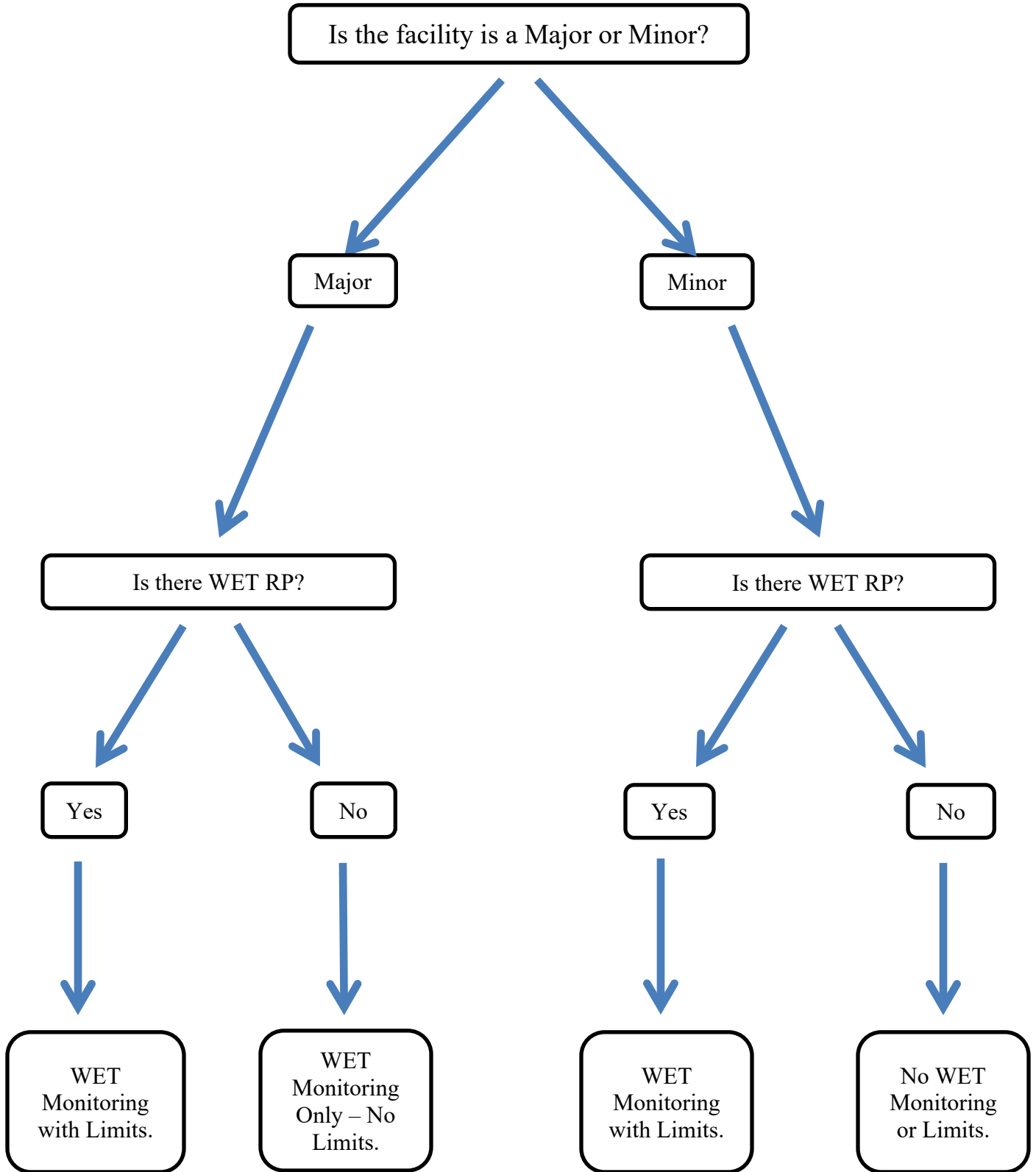


Figure 2
Acute or Chronic Flow Chart

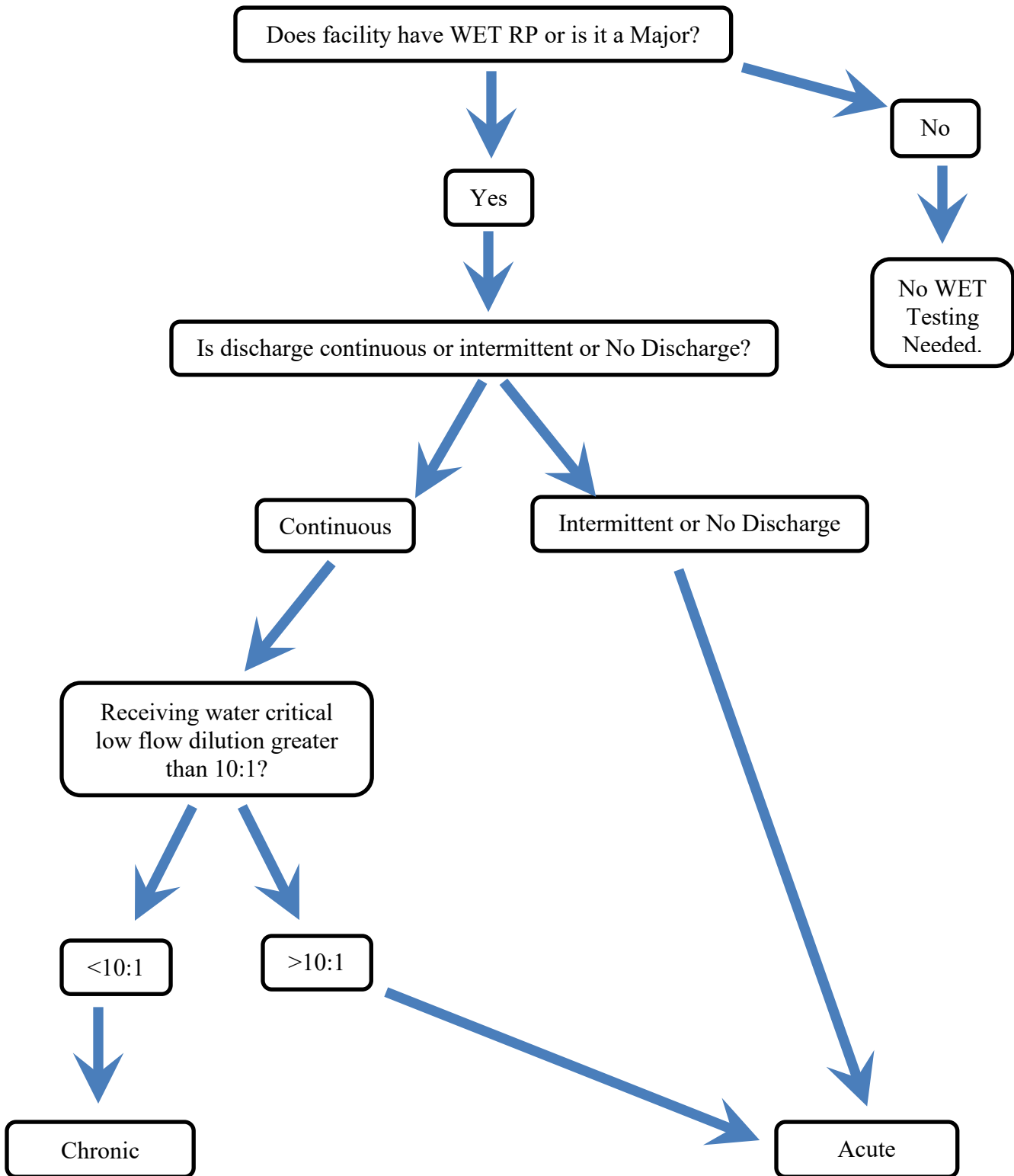
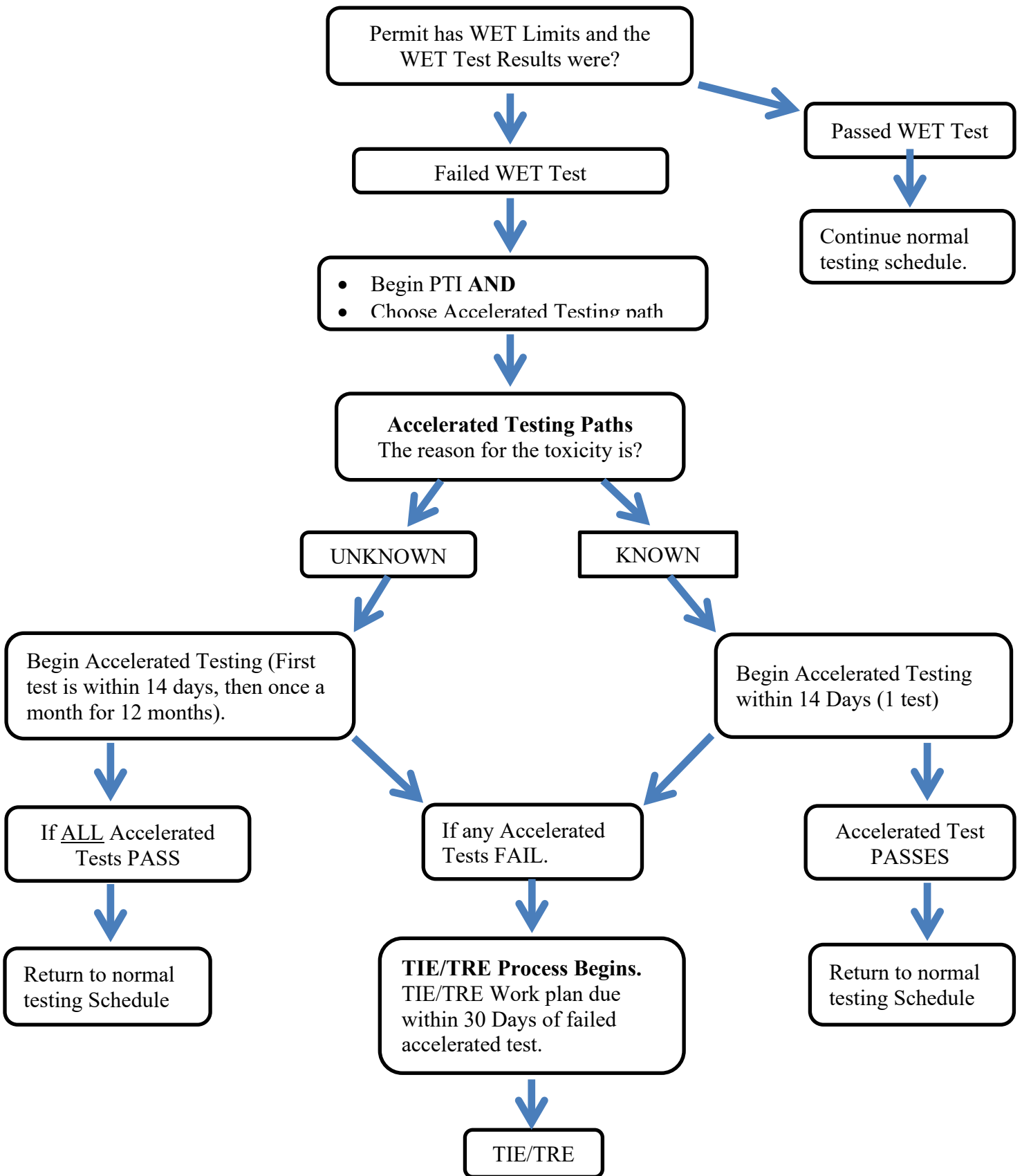


Figure 3
WET Limit Violation/Failure Flow Chart



APPENDIX D

ICIS & DATA BASE CODING

ICIS CODING

Please note that the permit writer must still select the appropriate Sample Type, Frequency of Analysis, Monthly or Quarterly DMR submission for both Acute and Chronic WET testing. Permit writer must also make adjustments as need to the TUC limits as needed for chronic WET testing.

***NOTE – If adding Chronic testing, also add the Acute parameters because they must still meet WQS.**

Acute WET Coding Example

	Start Date	End Date	Months	Quantity Units	Q1	Q2	Concentration Units	C1	C2	C3	Freq. of Analy.	Samp. Type
<input type="radio"/> Toxicity [acute], Ceriodaphnia dubia Parameter code: 61425 Monitoring Location Code: 1 Season ID: 0												
<input type="radio"/> <u>Base Limit</u>	01/01/2021	09/30/2025	ALL				tox acute	<	1.0	MAXIMUM	01/90	Grab
<input type="radio"/> Toxicity [acute], Pimephales promelas [Fathead Minnow] Parameter code: 61427 Monitoring Location Code: 1 Season ID: 0												
<input type="radio"/> <u>Base Limit</u>	01/01/2021	09/30/2025	ALL				tox acute	<	1.0	MAXIMUM	01/90	Grab

Chronic WET Coding Example

	Start Date	End Date	Months	Quantity Units	Q1	Q2	Concentration Units	C1	C2	C3	Freq. of Analy.	Samp. Type
<input type="radio"/> Toxicity [chronic], Ceriodaphnia dubia Parameter code: 61426 Monitoring Location Code: 1 Season ID: 0												
<input type="radio"/> <u>Base Limit</u>	10/01/2020	09/30/2025	ALL				tox chronic	<	1.0	MAXIMUM	01/90	24 Hour Composite
<input type="radio"/> Toxicity [chronic], Pimephales promelas [Fathead Minnow] Parameter code: 61428 Monitoring Location Code: 1 Season ID: 0												
<input type="radio"/> <u>Base Limit</u>	10/01/2020	09/30/2025	ALL				tox chronic	<	1.0	MAXIMUM	01/90	24 Hour Composite

DATABASE CODING

Please note that the permit writer must still select the appropriate Sample Type, Frequency of Analysis, Monthly or Quarterly DMR submission for both Acute and Chronic WET testing. Permit writer must also make adjustments as need to the TUC limits as needed for chronic WET testing.

APPENDIX E

FREQUENTLY ASKED QUESTIONS (FAQs)

Flow Rate / IWC

Q: What if we cannot get a stream flow rate to calculate the IWC due to the ice/weather?

A: In some old permits, the permittee calculates their own IWC, thus they need a flow rate of the receiving stream. If this happens, they should take all the flow rates for that month during the last 5 years or so if possible and use the average flow rate for that month. This practice is no longer acceptable. This is the same process the permit writers now do to establish the IWC for all new and re-issued permits. Another, although not the preferred option would be to go downstream or upstream and find the safest area.

Can't Take a WET Sample

Q: I have a problem and I can't take my WET sample until the start of the next monitoring period. Can I just do 2 WET tests the next period?

A: No, that will be considered a failure to sample. The tests must be "COMPLETED" i.e., all samples must be taken in the correct monitoring period. They should be sampling at the beginning of a monitoring period to allow for issues like weather, shipping issues, lack of personnel, etc.

Sample using Lab Dilution Water failed (Too Much Variability on the Upper End of the PMSD)

Q: What should I do if I failed a WET test and did several in stream samples and the one that fails is the one using Lab water?

A: In some cases, Lab water used for dilution water is too pure. Stream water has natural particulates, algae, sediments, etc. that help the water be more receptive to binding of contaminants. If the permittees requests to switch to use receiving stream water instead of Lab water, it may be approved. However, there is higher shipping costs and more labor intensive to collect. Not to mention there may be pollutants in the stream water.

Basically, this is a statistical issue. A failure can be trustworthy; however, a finding of no toxicity should not be regarded as a reliable indication that there is no toxic effect.

What we do not want to do is to keep switching between lab and stream water. Do not allow more than one switch in a permit cycle. This must also be done through a permit modification.

See Section 7 of the Chronic WET manual.

See Section 10.2.8.2.2 of the Chronic WET manual.

DMR Reporting when IC₂₅ has *Remark/Linear Interpolation (See: Chronic Method Manual 2002, Appendix M, pgs 41 – 46) (10/16/2019)

Explanation: South Dakota uses Point Estimates for Chronic WET testing and is the NPDES preferred statistical methods for calculating end points for WET testing (Probit Analysis, Linear Interpolation).

Q: What does the permittee enter into NetDMR when the IC₂₅ has an *Remark that says, "No Linear

Interpolation can be determined as none of the group response means are less than the control response mean”?

A: NODI “Q” (Not Quantifiable) shall be entered on the DMR. **This is considered a Passing Test.** This basically means that the Control and the Sample results are so close to each other that the Linear Interpolation analysis cannot be completed. To use Linear Interpolation there must be enough of a difference between the control and the sample. If all or nothing, another method, like Probit may need to be used.

Q: What do you report on the DMR when one of the IC₂₅ for either growth or reproduction is “*No linear interpolation” comment and the other has an IC₂₅ value.

A: Report the IC₂₅ value for that species.

Q: Can Linear Interpolation be used for NOEC.

A: No, Linear Interpolation is only to be used with Point Estimates like IC₂₅. SD does not use NOEC’s or LOEC’s.

Holding Time / Shipping Issues (See: Section 8 of Methods Manuals)

Q: Fed-ex lost a sample, then found it, now it will be past 36 hour holding time. What do I do?

A: For Acute – The holding must be no more than 36 hours. If it is, the sample is invalid, and they must send a new sample.

For Chronic - If it is the 1st sample it must meet 36 hours. You will need to take a new sample. If it is sample # 2 or # 3 (for days 3 or 5) and there is enough sample water to continue the test until the next sample arrives or the test is complete, then DANR can give approval to continue the test as long as it is less than 72 hours. (See: Holding Times section). If samples exceed 72 hours, it must be aborted. If there is enough water to continue the test until the next sample arrives and it meets holding times, the test may continue, if not, it must be aborted.

**NOTE – Due to the COVID-19 pandemic coupled with weather shipping delays and lab staffing the 1st sample may be extended to no more than 72 hours with prior written approval if the permittee meets ALL of the following conditions:*

- 1. It is on a case-by-case basis and DANR must be notified,*
 - 2. the delays must be due to the shipping company delays AND due to the pandemic or weather delays,*
 - 3. the facility must not have any recent/on-going failures of WET testing,*
 - 4. any changes to the standard method holding times must be documented on the lab sheets*
- Once the pandemic is declared over and shipping returns to normal, this variance will revert to standard methods holding/shipping times.*

Hardness of Dilution/Lab Water Issues (See: Section 7 of Methods Manuals)

Q: The lab or facility is afraid that if they match the receiving stream hardness of some Very Hard

receiving waters, the chemicals that are used to make this water may impact the tests. What do I do?

A: The labs are required to match the receiving stream category as close as possible. They do not have to match the exact hardness of the receiving stream.

i.e., If the Black Hills stream hardness is 1163, that is considered very hard water. So, the lab should use the Very Hard category, which has a range of 230-320. They should be near the 320 upper level but should not go above this which is in the Methods Manuals.

Chronic Test Spans Two Months / Monitoring Periods (05/15/2017)

Q: A facility has been granted alternating species and have quarterly monitoring. However, they have monthly IC₂₅ with different limits. ($\geq 33\%$ and $\geq 41\%$). Their results came back at 37%. Which month do we consider this test? One month it would be a failure, the other a pass.

A: Even though the test spanned 2 months, it should be considered when the test was initiated. However, since one would be a pass and the other a failure it is strongly recommended, they complete an additional test within 2 weeks. The permit should likely have a quarterly limit upon renewal. The start of the test was compared to a metals test that might have a 6-month holding time and run 6 months after it was collected. The sample is still considered when they took the sample. Recommend that tests be completed in the same month. It was also suggested that the 2 months limits could be averaged; however, in this case the average would also equal 37%, thus providing another reason to do a follow up test.

IC₂₅ vs IWC Explanation (06/06/2019)

Q: How does IC₂₅ relate to the IWC %

A: The IC₂₅ that we calculate in the permit is the instream waste concentration of the effluent in the receiving stream. The lab calculates an IC₂₅ based on the effluent and the dilution series. If the lab IC₂₅ is less than the permit IC₂₅ it means that the effluent is more toxic than the dilution that the stream will provide, and it is a permit violation. SDDANR sets the permit IC₂₅ to the IWC because that is the toxic level, and we want to make sure that the effluent is not toxic. SDDANR then uses the permit IC₂₅ to calculate the TU_C.

Facility Requesting to use CO₂ Overlay (01/30/2019)

Q: Facility is doing their first Chronic WET. They have a high ammonia ($>5\text{mg/L}$) and the Lab requested to use CO₂ overlay for that facility.

A: CO₂ prevents the pH from rising (pH drift). A higher pH can increase the ammonia's toxicity effect. EPA documentation suggests that once ammonia gets above 5 mg/L you can start to get ammonia toxicity. Using the CO₂ does not reduce the ammonia but rather keeps it stable by stabilizing the pH. The Chronic Methods Manual 2002 (Sections 11.2.6 and 12.3) talks about this and says that before assuming that the ammonia will cause toxicity in this test, you must run parallel test. One with and one without to show that ammonia is the issue. Once this is completed and if it shows that the pH creep is the cause, only then should the CO₂ overlay be approved. SD WET IMP requires a letter asking for such and then a permit modification must be completed. EPA documents also suggest that if a CO₂

overlay is approved, it should be given a pH cap similar to the receiving stream. The lab did say this should not be an issue in most cases.

Things to consider: CO₂ can mask the effects of metals if the pH is held to low. This facility has 3 metal finishers. They also have a limit for the month of 12.1. They expect their sample ammonia to be around 7mg/L. The additional cost of a parallel test is about \$1000. This only needs to be completed on the Minnows as Daphnia are not susceptible to ammonia. The request in this case was denied until a parallel test is completed to show the need for a CO₂ overlay. Also, if a permanent CO₂ overlay is approved, there should be an ammonia limit in place or added to the permit.

Altering of the WET tests by Dechlorinating (06/06/2019)

Q: Can a lab dechlorinate prior to doing the WET test?

A: No, unless the exception below applies. 40 CFR 122.44(d)(1)(v) only allow the WET test to be altered when a chemical specific limit is put in the permit. If the permit does not contain a chlorine limit, the WET test should not be altered (dechlorinated). A permit must specify that the lab can dechlorinate and must contain a Cl limit.

(v) Except as provided in this subparagraph, when the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, toxicity testing data, or other information, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative criterion within an applicable State water quality standard, the permit must contain effluent limits for whole effluent toxicity. Limits on whole effluent toxicity are not necessary where the permitting authority demonstrates in the fact sheet or statement of basis of the NPDES permit, using the procedures in paragraph (d)(1)(ii) of this section, that chemical-specific limits for the effluent are sufficient to attain and maintain applicable numeric and narrative State water quality standards.

Chronic Test with Acute Analysis (Mortality) Failure (10/16/2019)

Q: Can you get Acute WET results from a Chronic WET test?

A: YES. The TTT directly contradicts the Chronic WET Methods Manual page 141, section 13.1.2. The Methods Manuals supersede the TTT. This was confirmed by EPA R8 and EPA R&D in Duluth that you can get the Acute analysis results from a Chronic test based on the daily observations on mortality at the specified exposure periods. There is discussion about feeding rates and it being an experimental test in the TTT, but it is allowed.

DISCUSSION – If any of the dilutions fail the Acute LC₅₀, the test is normally stopped and thus considered a failure of the State Water Quality Standards. Newer permits will include the must meet ACUTE LC₅₀ language in permits, so it will also be considered a permit violation.

**NOTE – Some labs do this a little different. Some will do just the Acute Analysis and not charge extra. Others will do some type of abbreviated Acute test and do charge an extra fee.*

WET Test Required with Application (04/20/2021)

Q: Does a facility have to submit a WET test with their application?

A: It depends.

South Dakota Administrative Rule 74:52:05:13. Application requirements for whole effluent biological toxicity testing by POTWs. In addition to the information required by 74:52:02:08,

POTWs with design influent flow equal to or greater than one million gallons a day and POTWs with approved pretreatment programs or POTWs required to develop a pretreatment program shall provide the results of valid whole effluent toxicity testing to the secretary.

**NOTE – Currently all permittees that meet this rule have submitted a WET test or currently has WET testing in their permits. These WET test results are used in place of providing a separate test with an application. However, new permittees that meet these requirements must follow these rules.*

Common Failure Issues (04/20/2021)

- Quaternary Compounds (quaternary ammonium) – used in dairies/food processors to disinfect equipment, some port a potty toilets have this chemical in the blue liquid (i.e., Blue Seal). – Highly Toxic to WW bugs and WET test species.
- Formaldehyde – RV dump stations, port a potty toilets
- FHM – Ammonia, Chlorides
- Daphnia – *chlorine, *ammonia, Pesticides, Surfactants, metals *most common
- Plants – Metals, Herbicides

Selection of the Acute TAC # 9. Renewal of test solutions. (12/14/2021)

Q: Why did SDDANR select Renewal every 48hr for Acute test?

A: The Acute Methods manual recommends that solutions are renewed after 48hrs at a minimum. There was much discussion if the TAC should say ...at a maximum. Several labs in R8 were consulted and they can do any of them. Most if not all the R8 states only refer to the TAC and do not specify when to renew solution.

There are advantages and disadvantages for both. See Acute Methods Manual 2.7.1.2, 2.8.1, 2.8.2, 9.5.9 and the TTT Appendix D-6.

One question that an answer could not be found was If it is not renewed daily can you calculate the ACR which compares acute to chronic? The only Ref. to this was in a presentation WET Testing Permit Considerations – June 2014 from EPA.

IWC = RWC. (12/20/2021)

Note: In many of the older EPA documents IWC cannot be found. Note that IWC is the same as RWC.