

Module 9 - USEPA NPDES WET Permit Conditions, Permit Language and Technical Considerations



Notes:

Welcome to this presentation on the United States Environmental Protection Agency's, hereafter EPA, National Pollutant Discharge Elimination System, or NPDES, Whole Effluent Toxicity, or WET, Permit Conditions, Permit Language, and Technical Considerations. This presentation is part of a web-based training series on WET sponsored by EPA's Office of Wastewater Management's Water Permits Division.

You can review this stand-alone presentation, or, if you have not already done so, you might also be interested in viewing the other presentations in the series, which cover the use of WET in EPA's NPDES permit program.



Before we get started with this presentation, I will make some introductions and cover some important housekeeping items.

Presenters

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**Reference: EPA
Toxicity Test Methods**



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Notes:

First, the introductions.

Your speakers for this presentation are, me, Laura Phillips, and I am the EPA's NPDES WET Coordinator, and Jackie Clark, EPA's NPDES WET Coordinator with the Water Permits Division within the Office of Wastewater Management at the EPA Headquarters in Washington, D.C. Second, now for those housekeeping items. You should be aware that all the materials used in this presentation have been reviewed by EPA staff for technical and programmatic accuracy; however, the views of the speakers are their own and do not necessarily reflect those of the EPA. The NPDES permit program, which includes the use of toxicity testing, is governed by the existing requirements of the Clean Water Act and EPA's NPDES permit implementation regulations. These statutory and regulatory provisions contain legally binding requirements. However, the information in this presentation is not binding. Furthermore, it supplements, and does not modify, existing EPA policy and guidance on WET in the NPDES permit program. EPA may revise and/or update the contents of this presentation in the future.

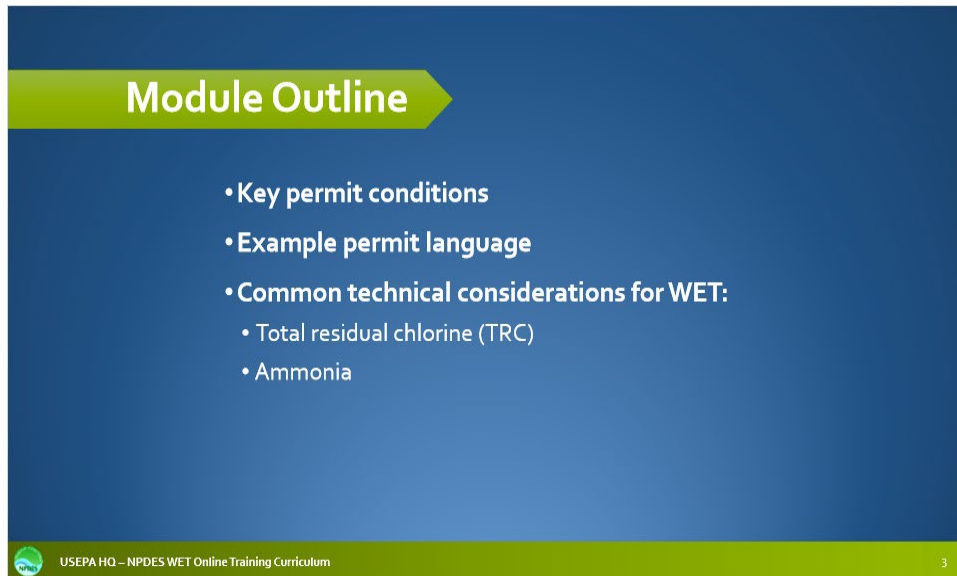
Throughout this module, the term "state" means a state, the District of Columbia, and the territories including the Commonwealth of Puerto Rico, the United States Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and the Trust Territory of the Pacific Islands and Tribes (40 CFR Part 122.2). The term "authorized Tribe" means those federally recognized Indian Tribes with authority to administer Clean Water Act water quality standards, WQS, program. In some instances we may use the term "permitting authority" to include

EPA, states, territories, and Tribes that have been authorized to administer the NPDES permit program.

This module was developed based on the live EPA Headquarters' NPDES WET course that the Water Permits Division of the Office of Wastewater Management has been teaching to EPA regions, states, territories, and authorized Tribes. This course, where possible, has been developed with both the non-scientist and scientist in mind. Also, while not necessary, a basic knowledge of biological principles and WET will be helpful to the viewer. Prior to this course, a review of the EPA's NPDES Permit Writers' online course, which is available at EPA's NPDES website, is recommended. See the "Resources" tab for a link to the NPDES training website.

When appropriate a blue button will appear on a slide to provide access to more information. By clicking this button, additional slides will present information regarding either freshwater or marine EPA toxicity test methods. When these additional slides are finished, you will be automatically returned to the module slide where you left off. The blue button on this slide provides the references for EPA's toxicity test methods that will be presented throughout this module.

Now that you know who we are and we have covered the housekeeping items, let me turn this over to Jackie to go over EPA's NPDES WET Permit Conditions, Permit Language and Technical Considerations.

A presentation slide with a dark blue background. At the top, a green arrow points right, containing the text "Module Outline" in white. Below this, a bulleted list is centered. The first three items are "• Key permit conditions", "• Example permit language", and "• Common technical considerations for WET:". The last item has two sub-bullets: "• Total residual chlorine (TRC)" and "• Ammonia". At the bottom, a green bar contains a small circular logo on the left, the text "USEPA HQ – NPDES WET Online Training Curriculum" in the center, and the number "3" on the right.

Module Outline

- Key permit conditions
- Example permit language
- Common technical considerations for WET:
 - Total residual chlorine (TRC)
 - Ammonia

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Notes:

Thanks, Laura. As Laura noted, the objectives of this module are to describe key NPDES WET permit conditions and recommended language for incorporating these conditions into NPDES permits. This module will also discuss technical considerations for total residual chlorine and ammonia which may present challenges for implementing WET in NPDES permits.

NPDES WET Permit Conditions

- Toxicity test type (acute or short-term chronic) and test duration
- EPA toxicity test species and methods
- Monitoring frequency representative of effluent
- Sample collection and handling
- Upfront statistical test endpoint
- Dilution water and dilution series
- Reference toxicant testing and other quality assurance (QA) test conditions
- Required toxicity test results reviews (e.g., concentration-response relationship [CRR], percent minimum significant difference [PMSD])
- Diagnostic steps to address toxicity (e.g., toxicity reduction evaluations [TRE], toxicity identification evaluation [TIE])
- Re-opener permit clause and/or conditions
- Discharge Monitoring Report (DMR) Requirements

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Notes:


In addition to WET limits or triggers, other WET permit conditions listed here and discussed in the previous modules should be included in the permit. For example, the NPDES permit should specify the type of toxicity test, acute or chronic; as well as the specific EPA toxicity test method and the EPA toxicity test species to be used for toxicity monitoring, making sure that the latest EPA-approved toxicity test methods are specified or incorporated by reference in the permit. These toxicity test methods are specified in the Code of Federal Regulations, CFR, at 40 CFR Part 136 or, in the case of EPA West Coast toxicity test methods, in the document entitled *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA-600-R-95-136). In addition, the NPDES permit should clearly specify the appropriate toxicity test endpoints to be calculated and the statistical approaches to be used for each type of toxicity test required. Another important condition to specify in the NPDES permit is the dilution water to be used in toxicity testing, for example, laboratory water or water from the receiving waterbody if it is found not to be toxic. Additionally, NPDES permit conditions should include requested documentation of the Quality Assurance/Quality Control, QA/QC, reviews completed; as well as toxicity monitoring requirements for when an exceedance of the permit's WET trigger or WET limit occurs, such as an accelerated toxicity monitoring schedule and accompanying regulatory actions depending on the results of the accelerated toxicity monitoring. NPDES permits should also include permit conditions with respect to Toxicity Reduction Evaluation/Toxicity Identification Evaluation, TRE/TIE,

plan requirements. A re-opener clause or additional permit requirements should be included in the NPDES permit to address cases where the toxicity test data indicate toxicity conditions which could require modifying the permit to include WET limits if not already in the permit.

WET Test Species and Methods

- Required EPA WET test methods (40 CFR Part 136)
 - Acute freshwater and marine – 5th edition (2002)
 - Short-term chronic freshwater – 4th edition (2002)
 - Short-term chronic marine – 3rd edition (2002)
- Recommended EPA West Coast Test Methods (1995) - short-term chronic marine
- Recommend multi-species screening: invertebrate and fish for acute testing
- Recommend multi-species screening: alga, invertebrate and fish for short-term chronic testing



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Notes:

As discussed in more detail in the NPDES Testing Methods for Whole Effluent Toxicity module, there are many EPA toxicity test methods and test species available for NPDES WET permit monitoring. In general, after toxicity testing has been conducted several times for an NPDES permitted facility, monitoring should continue using the EPA toxicity test species that was determined to be the most sensitive to toxic impacts of the effluent in order to properly characterize the effluent's toxicity for both permit compliance and reasonable potential determinations for the next permit reissuance.

Test Type and Duration

Acute toxicity tests are conducted as:

- Static non-renewal, static renewal or flow-through test
- Test Duration: 24, 48 or 96 hours

Short-term chronic toxicity tests are conducted as:

- Test type specified in EPA toxicity test methods manuals
- Test Duration: eight days or less

East Coast Marine Short-term Chronic Test Type and Duration

West Coast Marine Short-term Chronic Test Type and Duration

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Notes:

EPA toxicity test methods may be conducted using a static non-renewal, static renewal, or flow-through testing approach, depending on the toxicity test method selected. As introduced in the NPDES Testing Methods for Whole Effluent Toxicity module, static non-renewal, static renewal, and flow-through approaches have to do with whether toxicity testing chambers are refreshed with the designated effluent dilution per the requirements of the toxicity test method selected. Static non-renewal is not refreshed, static renewal is refreshed daily, and, in the flow-through approach, chambers receive a continual flow-through of the diluted effluent throughout the duration of the toxicity test. The NPDES permit should describe what toxicity test exposure type (meaning static non-renewal, static renewal, or flow-through) is allowed for toxicity testing based on the toxicity test method being applied. Acute tests allow for more flexibility, whereas for chronic tests, the type of exposure to the effluent is specified in the EPA's toxicity test methods. The EPA acute toxicity test methods also allow for some flexibility in the test duration depending on the type of toxicity test, which can range from 24 to 96 hours but is typically a 48-hour toxicity test. The NPDES permit should specify the toxicity test duration required for a given acute EPA toxicity test method. Short-term chronic EPA toxicity test methods, however, specify duration of the toxicity test, which is eight days or less, depending on the toxicity test method. Please see the NPDES Testing Methods for Whole Effluent Toxicity module for more details regarding toxicity test types and the duration of toxicity tests.

Example Permit Language

Freshwater Acute

Species and test methods for estimating the acute toxicity of NPDES effluents are found in the fifth edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002; Table IA, 40 CFR Part 136). The permittee shall conduct **48-hour or 96-hour; static or static renewal** toxicity tests with the following vertebrate species:

- The fathead minnow, *Pimephales promelas* (Acute Toxicity Test Method 2000.o);
- The rainbow trout, *Oncorhynchus mykiss*, or brook trout, *Salvelinus fontinalis* (Acute Toxicity Test Method 2019.o);

And the following invertebrate species:

- The daphnid, *Ceriodaphnia dubia* (Acute Toxicity Test Method 2002.o);
- The daphnid, *Daphnia pulex*, or daphnid, *Daphnia magna* (Acute Toxicity Test Method 2021.o).

East Coast Marine
Acute Permit Language

West Coast Marine
Acute Permit Language

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Notes:

On this slide, example permit language for incorporating freshwater acute toxicity testing methods is presented. The text in blue represents language choices that a permit writer can use to require different toxicity test durations, toxicity test exposure types, and toxicity test species.

Example Permit Language


Short-term Freshwater Chronic

Species and short-term test methods for estimating the chronic toxicity of NPDES effluents are found in the fourth edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002; Table 1A, 40 CFR Part 136). The permittee shall conduct short-term chronic toxicity tests with the following species:

- The fathead minnow, *Pimephales promelas* (Larval Survival and Growth Test Method 1000.01);
- The daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.01); and
- The green alga, *Raphidocelis subcapitata* (formerly *Selenastrum capricornutum*) (Growth Test Method 1003.0).

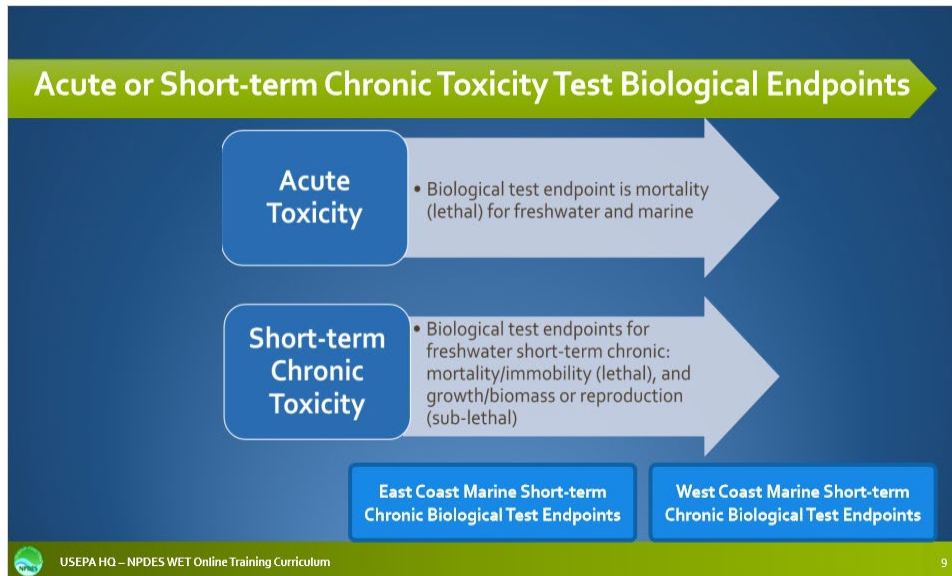
[East Coast Marine Short-term Chronic Permit Language](#)

[West Coast Marine Short-term Chronic Permit Language](#)

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Notes:

Here is example permit language for incorporating EPA's freshwater short-term chronic toxicity testing methods. Since there are only three freshwater short-term chronic toxicity test methods at 40 CFR Part 136, Table 1A to use in NPDES permits, until the most sensitive test species have been determined based on prior toxicity test data for the permitted facility, the permit writer uses three toxicity tests which includes a vertebrate or fish, an invertebrate or water flea, and a green alga or plant for conducting freshwater short-term chronic toxicity testing. The renewal and duration are prescribed in each of the short-term chronic freshwater toxicity test methods for how they are to be conducted.



Notes:

The NPDES Testing Methods for Whole Effluent Toxicity module discusses the various EPA toxicity test methods, types of toxicity test endpoints, and other important information regarding toxicity testing under the NPDES permit program. The NPDES permit should include important specifications for the toxicity tests to be conducted so that it is clear what is required under the permit, and thus expected, and not left up to the laboratory or permittee to decide. In addition to specifying the types of toxicity tests required, acute or short-term chronic, the permit should specify the associated toxicity test endpoints to be reported by the permittee. The type of toxicity test endpoints required to be reported should be based on the facility-specific NPDES WET permit limits or monitoring or TIE/TRE triggers developed by the NPDES permitting authority, the available effluent dilution in the receiving waterbody, if mixing zones are allowed under the state's water quality standards, and other factors discussed previously in this course.

Suggested Toxicity Monitoring Frequency

Testing Frequency	Volume of Discharge
Monthly	> 1 MGD
Quarterly	≤ 1 MGD

Other Considerations:

- Case-by-case basis
- Intermittent discharge
- Compliance record
- Effluent variability

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Notes:

Toxicity monitoring should be sufficiently frequent to appropriately characterize and capture the possible toxic impacts of the NPDES permitted effluent on aquatic organisms in the receiving water. In general, EPA recommends monthly toxicity testing for high flow effluent discharges, for example, greater than one million gallons per day; and quarterly toxicity testing for effluent discharges having less flow. The frequency of toxicity testing to include in the NPDES permit is determined on a case-by-case basis. Factors to consider when determining the appropriate toxicity test monitoring frequency include whether the effluent is discharged intermittently, meaning the wastewater treatment discharges are released into the receiving water periodically rather than continuously; the NPDES facility's compliance record, including for other non-WET NPDES permit conditions; and the degree of effluent variability in terms of discharge flow rates or other water quality parameters monitored in their permit. If the permitted effluent is discharged intermittently, the timing and frequency of toxicity monitoring should be specified accordingly. In addition, if the facility has a history of permit violations as part of its NPDES permit compliance record or the facility's effluent composition is likely to be highly variable due to fluctuations of the facility's operations, for example seasonal differences, production process changes, or changes in the type of wastewater treatment used, then more frequent monitoring, such as monthly toxicity testing where quarterly monitoring may otherwise have been required, may be necessary for the monitoring to be representative of the permitted effluent.

Likelihood of Detecting at Least One Toxic Event When True Probability of Toxic Occurrence is X%			
# of Toxicity Tests	True Probability of Toxic Occurrence		
	10%	20%	30%
1	0.10	0.20	0.30
5	0.41	0.67	0.83
10	0.65	0.89	0.97
20	0.88	0.99	0.99

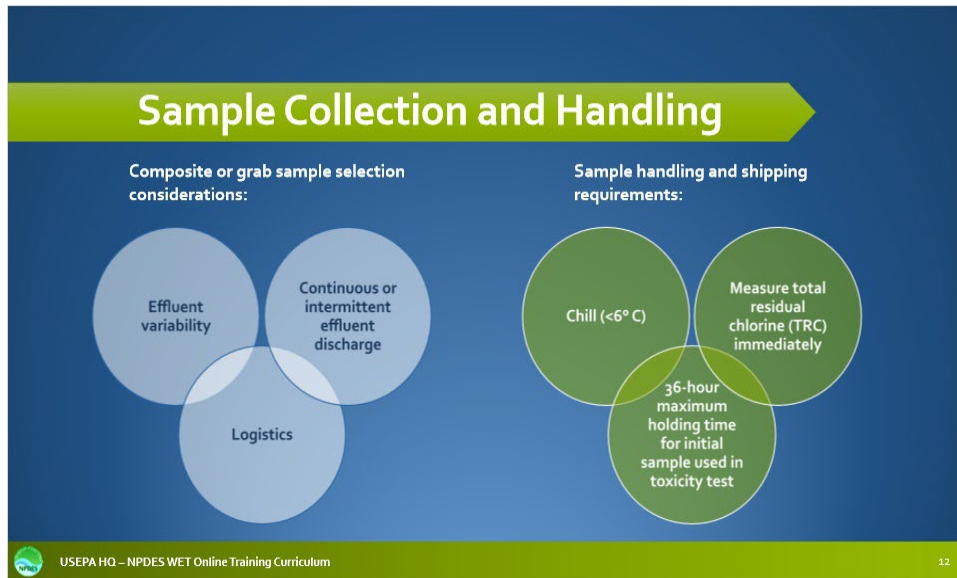


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Notes:

This slide shows the probability of detecting a truly toxic sample from an NPDES facility's discharge depending on the actual percent of toxic effluent occurrences (the percentages shown along the top row of the table) and the number of toxicity tests conducted on the effluent. What this table shows is that if, for example, an effluent is actually toxic 30 percent of the time, and the facility's NPDES permit requires one WET test a year, then there is only a 30 percent, or 0.30, probability that effluent toxicity will be detected (see the fourth column, second row of the table), even though the effluent is actually toxic almost a third of the time. By contrast, note that if the NPDES permit was to require five WET tests a year for this same effluent, there would be an 83 percent, or 0.83, probability of detecting toxicity in this effluent (see the fourth column, third row of the table). Often, the actual percentage of toxicity events is not known for an effluent discharge. For this reason, *EPA's Technical Support Document for Water Quality-based Toxics Control*, or the EPA's 1991 TSD, recommends at least quarterly WET test monitoring in NPDES permits.

**Notes:**


How the permitted effluent should be collected and handled for toxicity test monitoring is another important aspect that should be clearly specified in the NPDES permit. Often, states require that either time-weighted or flow-weighted 24-hour composite samples are to be collected for toxicity testing, because these types of samples give a good indication of the average effluent quality over a 24-hour period. However, in some cases, a grab sample may be more appropriate. For example, in cases where an effluent is known to be highly variable, even within a 24-hour period, such as with intermittent discharges or periodic facility batch treatment releases, grab samples rather than 24-hour composite samples may yield a more representative assessment of whether the effluent is toxic to aquatic organisms in the receiving waterbody. The inherent logistics in collecting samples may also play a role in determining whether composite or grab samples should be required. If the facility's effluent discharge is in a very remote location, where it is challenging to obtain a 24-hour composite sample, grab samples may be pragmatically the only option. Sample handling requirements for toxicity test monitoring are discussed in detail in the NPDES Testing Methods for Whole Effluent Toxicity module and the NPDES Reviewing WET Tests and WET QA/QC module. Samples need to be chilled to less than six degrees Celsius if they will not be tested immediately. Total residual chlorine, or TRC, in the sample should be measured right after collection and recorded in the sample chain of custody form for later inspection by the laboratory receiving the sample for toxicity testing. This is part of

the documentation that should be completed for toxicity testing and this information should be readily available if requested by the permitting authority or a laboratory inspector. Samples received by the laboratory for toxicity testing should be held no longer than 36 hours from the time the sample collection was completed. In some instances where the logistics for collecting samples prohibit timely shipping of the sample, a variance of the 36-hour holding time can be granted to allow up to 72-hours before first use of the collected sample.

Example Permit Language

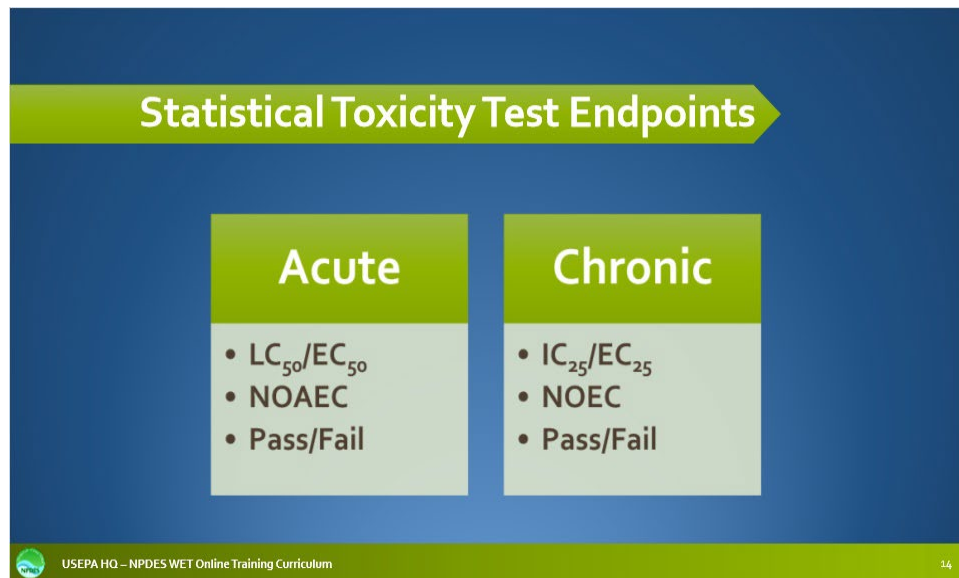
The permittee shall conduct monthly/quarterly/semi-annual/annual; acute/chronic toxicity tests on a grab/24-hour composite effluent sample(s). The permittee shall split a grab/24-hour composite effluent sample(s) and concurrently conduct two/three toxicity tests using a fish and an invertebrate species or a fish, an invertebrate and an alga species; after three rounds of toxicity testing, the permittee shall then continue to conduct routine monthly/quarterly/semi-annual/annual toxicity testing using the single, most sensitive test species.

Acute/Chronic toxicity test samples shall be collected for each effluent discharge point at the designated NPDES sampling station (i.e., downstream from the last treatment process and any in-plant return flows where a representative effluent sample can be obtained). During years 1, 2, 3, 4 and 5 of the permit, a split of each sample shall be analyzed for all other monitored parameters specified by the effluent monitoring program.

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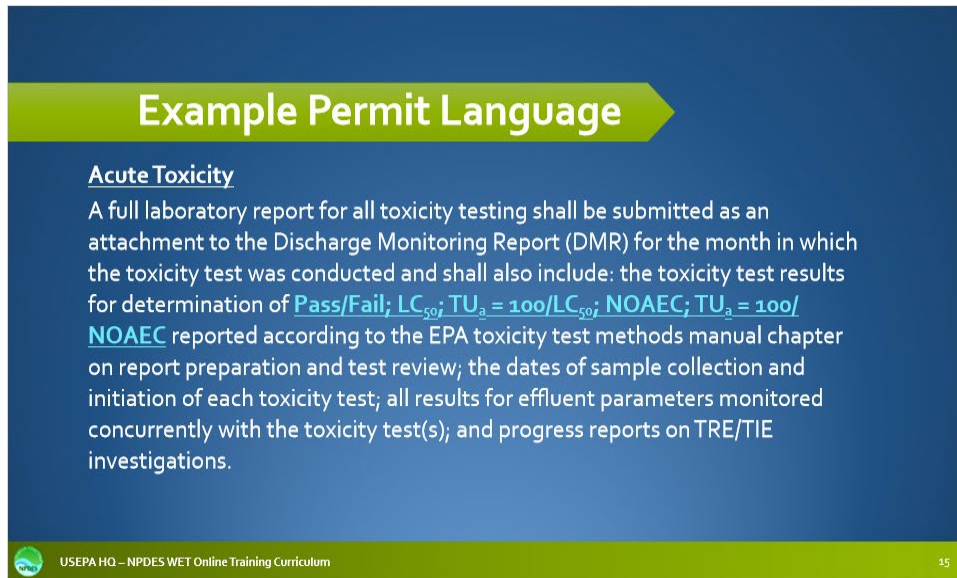
Notes:

This slide presents example permit language for incorporating monitoring frequency, sample type, the number and type of test species to use, and which years of the permit cycle to conduct toxicity tests. The text in blue indicates the choices that a permit writer can select depending on the various factors discussed in the previous slides in this module. The permit writer should ensure that the decisions made are based on the specific effluent situation they are permitting for and result in monitoring that will be representative of the facility's discharge.



Notes:

An additional permit condition that should be included in the permit is the statistical toxicity test endpoints. The NPDES permit should clearly specify the statistical toxicity test endpoints that are to be reported with the toxicity monitoring test data required by the NPDES permit. The NPDES WET Statistical Analysis and Toxicity Data Review module presents a detailed discussion of the different statistical test endpoints listed here in this slide.



Example Permit Language

Acute Toxicity

A full laboratory report for all toxicity testing shall be submitted as an attachment to the Discharge Monitoring Report (DMR) for the month in which the toxicity test was conducted and shall also include: the toxicity test results for determination of Pass/Fail; LC₅₀; TU_a = 100/LC₅₀; NOAEC; TU_a = 100/NOAEC reported according to the EPA toxicity test methods manual chapter on report preparation and test review; the dates of sample collection and initiation of each toxicity test; all results for effluent parameters monitored concurrently with the toxicity test(s); and progress reports on TRE/TIE investigations.

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Notes:

The example permit language included in this slide is for identifying the statistical toxicity test endpoints to be calculated based on the acute toxicity testing conditions. The text in blue represents options that a permit writer can select for incorporating toxicity testing specifications and calculations in the permit depending on the state narrative or numeric aquatic life protection criteria for WET.

Example Permit Language

Short-term Chronic Toxicity

A full laboratory report for all toxicity testing shall be submitted as an attachment to the Discharge Monitoring Report (DMR) for the month in which the toxicity test was conducted and shall also include: the toxicity test results in Pass/Fail; NOEC; $TU_c = 100/NOEC$; EC_{25} (or IC_{25}); $TU_c = 100/EC_{25}$ (or IC_{25}) reported according to the EPA toxicity test methods manual chapter on report preparation and test review; the dates of sample collection and initiation of each toxicity test; all results for effluent parameters monitored concurrently with the toxicity test(s); and progress reports on TRE/TIE investigations.

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Notes:

The example permit language included in this slide is for identifying the statistical toxicity test endpoints to be calculated based on short-term chronic toxicity testing conditions. The text in blue represents options that a permit writer can select for incorporating toxicity testing specifications and calculations in the permit depending on the state narrative or numeric aquatic life protection criteria for WET.

Dilution Series Selection

- **Effluent testing using EPA's 2002 toxicity test methods (40 CFR Part 136):**
 - Multi-concentration toxicity test: 5 effluent toxicity test concentrations and a control
 - For $IWC \leq 50\%$, recommend bracketing the IWC: Control, $0.25 \times IWC$, $0.5 \times IWC$, $1.5 \times IWC$, and $2 \times IWC$.
 - For $IWC > 50\%$, recommend bracketing the IWC: Control, $0.25 \times IWC$, $0.5 \times IWC$, $(IWC + 100)/2$; and 100%
- **Stormwater and ambient water testing not covered under a permit:**
 - Single toxicity test concentration:
 - 100% sample and a control

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Notes:


EPA toxicity test methods at 40 CFR Part 136 require five effluent test concentrations and a control treatment. The effluent test concentrations selected for a toxicity test can impact the statistical analysis used and the confidence one has in the resulting toxicity test statistical test endpoints, as discussed in the NPDES WET Statistical Analysis and Toxicity Data Review module. In general, EPA recommends using an effluent test concentration series that brackets the permitted effluent in-stream waste concentration, or IWC. For facilities that have a permitted IWC less than or equal to 50 percent effluent, the effluent test concentration series could be 0.25 times the IWC as the lowest effluent concentration, 0.5 times the IWC, the IWC itself, 1.5 times the IWC, and 2 times the IWC, plus a control treatment. For those facilities that have an IWC greater than 50 percent effluent, the toxicity test dilution series will need to be adjusted accordingly. For facilities that have an IWC at or near 100 percent, it may be appropriate to use a general dilution series such as 12.5, 25, 50, 75, and 100 percent effluent, plus a control treatment. The effluent test concentration series should not use closely spaced effluent test concentrations. EPA recommends using a dilution factor greater than or equal to 0.5. If too small a dilution factor is used, for example, control treatment, plus 70, 75, 80, 85, 90 percent effluent test concentrations, where the IWC is 80 percent effluent, then precision of the statistical test endpoint will be compromised, and therefore, one will have less confidence in the toxicity test endpoint reported. Ambient toxicity testing or collecting samples from the waterbody and testing them in the laboratory using

EPA toxicity test methods, and unpermitted stormwater toxicity testing do not require conducting the toxicity test with multiple dilutions of the collected ambient or stormwater sample. In these cases, the toxicity test typically consists of a control treatment and the undiluted test sample.

Example Permit Language

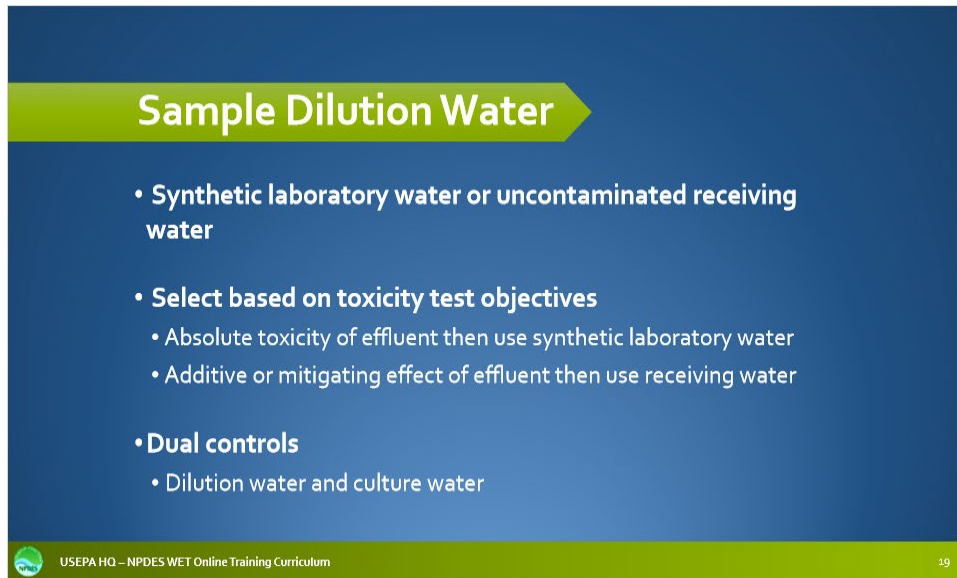
Acute
The acute in-stream waste concentration (IWC) for this discharge is **XX%** effluent. A series of at least five effluent dilutions and a control shall be tested. At a minimum, the dilution series shall include the IWC and two dilutions above and two dilutions below the IWC (e.g., 100%, $[IWC+100]/2$, IWC, $IWC/2$ and $IWC/4$).

Short-term Chronic
The chronic in-stream waste concentration (IWC) for this discharge is **XX%** effluent. A series of at least five effluent dilutions and a control shall be tested. At a minimum, the dilution series shall include the IWC and two dilutions above and two dilutions below the IWC (e.g., 100%, $[IWC+100]/2$, IWC, $IWC/2$ and $IWC/4$).

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Notes:

Here, example permit language for incorporating the recommended dilution series for acute or short-term chronic toxicity testing is presented. The text in blue represents permit language that a permit writer must determine based on each individual facility. This example includes a description of how to set up a dilution series, giving some discretion to the permittee or laboratory as long as it meets the requirements specified here.



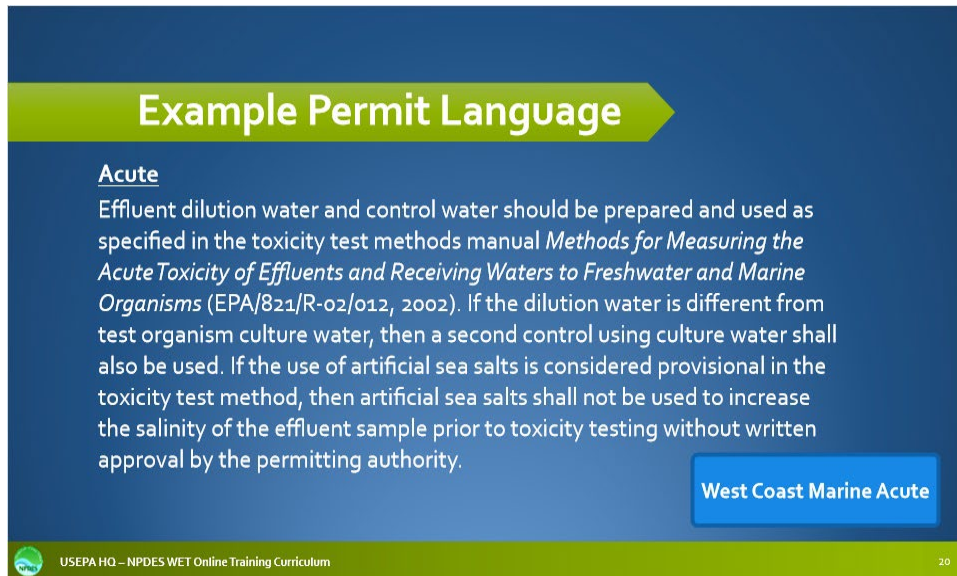
Sample Dilution Water

- **Synthetic laboratory water or uncontaminated receiving water**
- **Select based on toxicity test objectives**
 - Absolute toxicity of effluent then use synthetic laboratory water
 - Additive or mitigating effect of effluent then use receiving water
- **Dual controls**
 - Dilution water and culture water

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Notes:

The NPDES permit should specify the type of dilution water to be used in WET monitoring. The NPDES Testing Methods for Whole Effluent Toxicity module discusses dilution water. Generally, most states require the use of synthetic laboratory dilution water using the recipes given in EPA's toxicity test methods manuals. If the permit requires the permitted discharger to use dilution water obtained from the field, such as the receiving water, the laboratory should also run a control treatment using laboratory dilution water as a quality control check on the field collected dilution water.



Example Permit Language

Acute

Effluent dilution water and control water should be prepared and used as specified in the toxicity test methods manual *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002). If the dilution water is different from test organism culture water, then a second control using culture water shall also be used. If the use of artificial sea salts is considered provisional in the toxicity test method, then artificial sea salts shall not be used to increase the salinity of the effluent sample prior to toxicity testing without written approval by the permitting authority.

West Coast Marine Acute

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Notes:

Example permit language for incorporating the recommended dilution water for acute toxicity testing is presented on this slide.

Example Permit Language

Short-term Chronic Freshwater

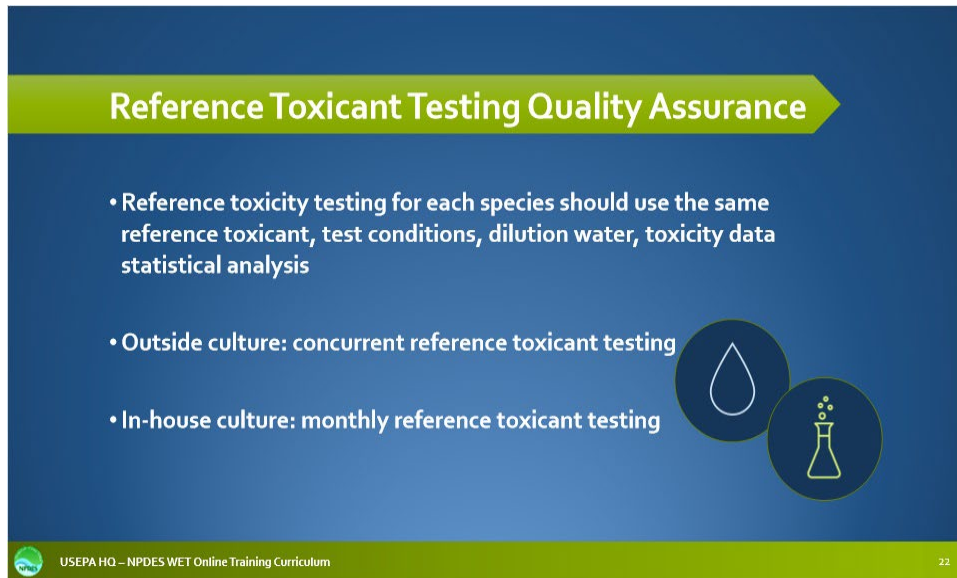
Effluent dilution water and control water should be standard synthetic dilution water, as described in the toxicity test methods manual *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002). If the dilution water is different from the test organism culture water, then a second control using culture water shall be used.

East Coast Marine Short-term Chronic West Coast Marine Short-term Chronic

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Notes:

Example permit language for incorporating the recommended dilution water for short-term chronic freshwater toxicity testing is presented here.



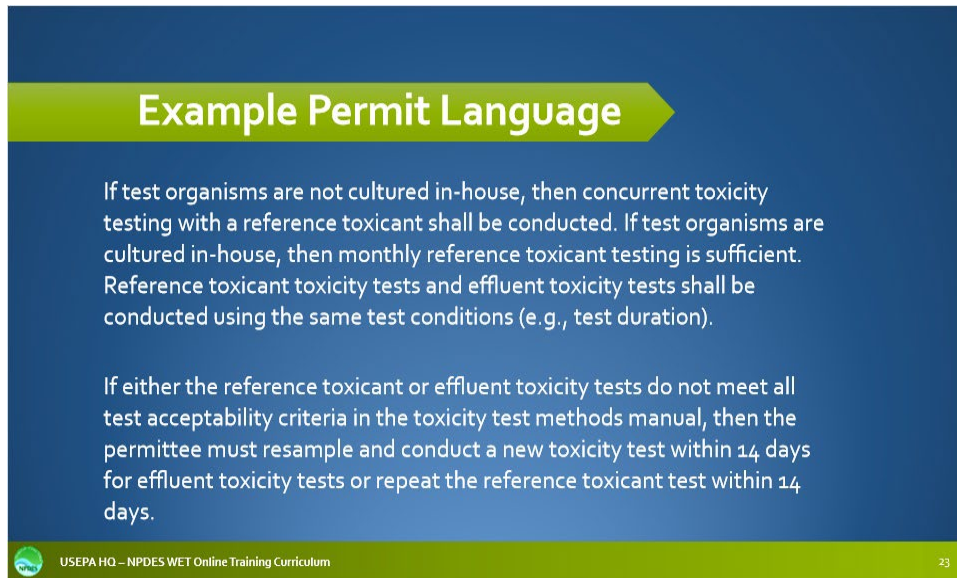
Reference Toxicant Testing Quality Assurance

- Reference toxicity testing for each species should use the same reference toxicant, test conditions, dilution water, toxicity data statistical analysis
- Outside culture: concurrent reference toxicant testing
- In-house culture: monthly reference toxicant testing

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Notes:

As explained in detail in the NPDES Reviewing WET Tests and WET QA/QC module, laboratory reference toxicant testing information should accompany toxicity test results submitted to the permittee and the NPDES permitting authority. This provides a quality assurance check on the laboratory and the toxicity test results submitted. If the toxicity test organisms are not from the laboratory's cultures and were obtained from an external supplier, EPA requires concurrently challenging a subset of those test organisms in a reference toxicant test to assess the health and sensitivity of the test organisms. If the test organisms are obtained from in-house cultures, then reference toxicant testing of those test organisms should be conducted monthly to ensure that they are in satisfactory health before initiating a toxicity test.



Example Permit Language

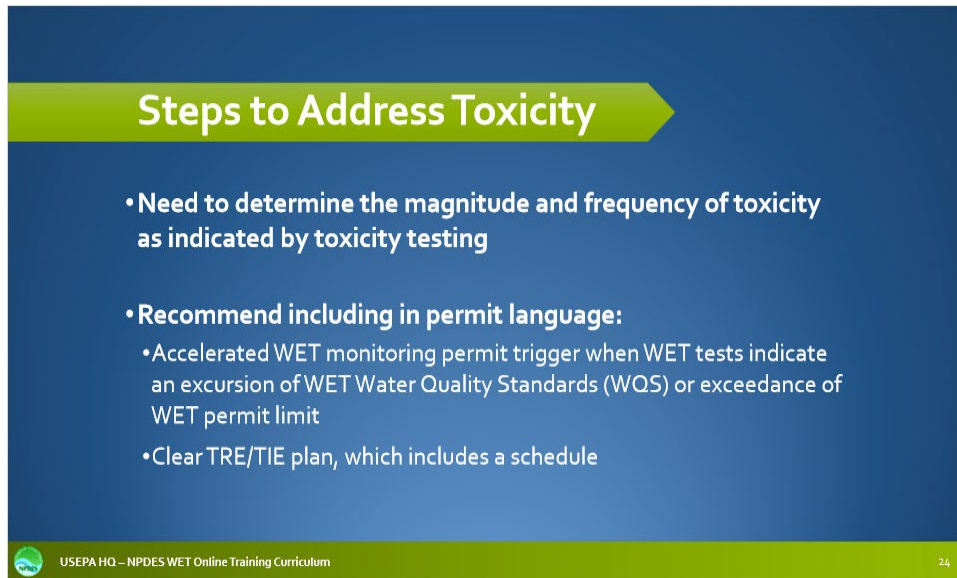
If test organisms are not cultured in-house, then concurrent toxicity testing with a reference toxicant shall be conducted. If test organisms are cultured in-house, then monthly reference toxicant testing is sufficient. Reference toxicant toxicity tests and effluent toxicity tests shall be conducted using the same test conditions (e.g., test duration).

If either the reference toxicant or effluent toxicity tests do not meet all test acceptability criteria in the toxicity test methods manual, then the permittee must resample and conduct a new toxicity test within 14 days for effluent toxicity tests or repeat the reference toxicant test within 14 days.

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Notes:

Example permit language for incorporating the requirement to conduct concurrent reference toxicant tests for test organisms not cultured in-house, or monthly reference toxicant tests for test organisms cultured in-house is presented here. This example is applicable to all toxicity testing methods including freshwater or marine acute, short-term chronic freshwater, and East or West Coast short-term chronic marine.



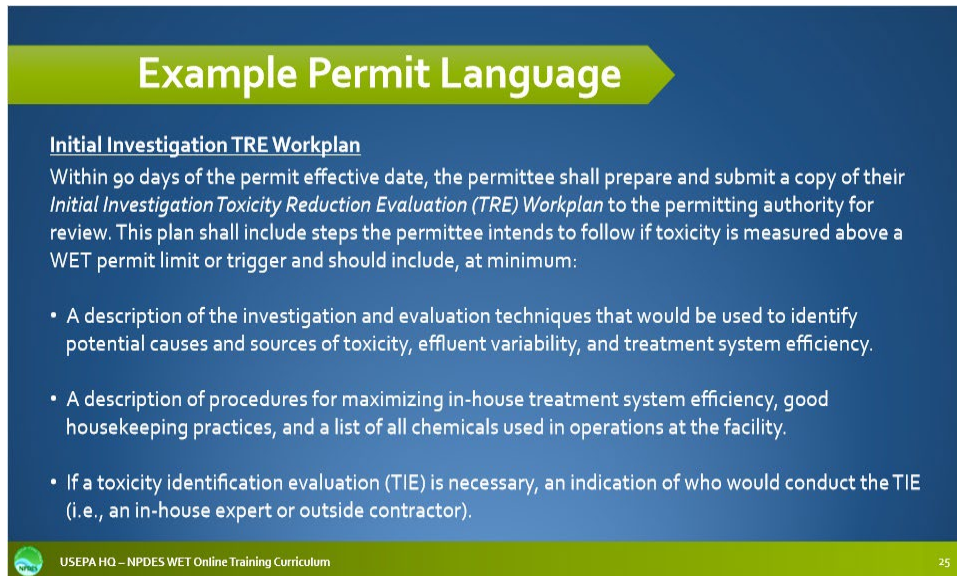
Steps to Address Toxicity

- Need to determine the magnitude and frequency of toxicity as indicated by toxicity testing
- Recommend including in permit language:
 - Accelerated WET monitoring permit trigger when WET tests indicate an excursion of WET Water Quality Standards (WQS) or exceedance of WET permit limit
 - Clear TRE/TIE plan, which includes a schedule

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Notes:

The magnitude and frequency of a permitted discharge's toxicity, as demonstrated by valid toxicity test data generated from the NPDES permit's toxicity monitoring, should be routinely reviewed by the NPDES permitting authority. In addition, it is a good strategy to include conditions in the NPDES permit that specify follow-up or accelerated toxicity testing requirements if toxicity is observed in a toxicity test that results in non-compliance with the permit's WET limits or indicates an excursion of the state's WET water quality standards. The NPDES permit should specify the need for a TRE/TIE if the accelerated WET testing data indicate that the effluent is toxic at a level that would result in an excursion of the state's WET water quality standards. The NPDES Toxicity Reduction Evaluation (TRE) and Toxicity Identification Evaluation (TIE) module in this NPDES WET course discusses in more detail the use of TREs/TIEs in NPDES permits.



Example Permit Language

Initial Investigation TRE Workplan

Within 90 days of the permit effective date, the permittee shall prepare and submit a copy of their *Initial Investigation Toxicity Reduction Evaluation (TRE) Workplan* to the permitting authority for review. This plan shall include steps the permittee intends to follow if toxicity is measured above a WET permit limit or trigger and should include, at minimum:

- A description of the investigation and evaluation techniques that would be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency.
- A description of procedures for maximizing in-house treatment system efficiency, good housekeeping practices, and a list of all chemicals used in operations at the facility.
- If a toxicity identification evaluation (TIE) is necessary, an indication of who would conduct the TIE (i.e., an in-house expert or outside contractor).

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Notes:

Example permit language for incorporating the requirement to prepare a TRE work plan is included in this slide. The plan should include a description of the investigation and evaluation techniques as well as the methods for maximizing in-house treatment, and if necessary, an indication of who would conduct a TIE.

Example Permit Language

Accelerated Toxicity Testing

- If an/a acute/chronic permit WET limit or trigger is exceeded and the source of toxicity is known (e.g., a temporary plant upset), then the permittee shall conduct one additional toxicity test using the same test species and toxicity test method. This test shall begin within 14 days of receipt of toxicity test results exceeding an/a acute/chronic permit WET limit or trigger. If the additional toxicity test does not exceed an/a acute/chronic WET permit limit or trigger, then the permittee may return to their regular testing frequency.
- If an/a acute/chronic permit WET limit or trigger is exceeded and the source of toxicity is not known, then the permittee shall conduct XX additional toxicity tests using the same test species and toxicity test method, approximately every two weeks, over a XX-week period. This testing shall begin within 14 days of receipt of toxicity test results exceeding an/a acute/chronic permit WET limit or trigger. If none of the additional toxicity tests exceed an/a acute/chronic permit WET limit or trigger, then the permittee may return to their regular testing frequency.

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Notes:


The example permit language presented on this slide may be used by the permit writer to incorporate a requirement for an accelerated monitoring frequency when a permit WET limit or trigger is exceeded. The text in blue represents permit language options to be determined by the permit writer.

Example Permit Language

TRE/TIE Process

If one of the additional accelerated toxicity tests exceeds [an/a acute/chronic](#) WET permit [limit or trigger](#), then, within 14 days of receipt of this test result, the permittee shall initiate a TRE using as guidance [Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants \(EPA/833/B-99/002, 1999\)](#) or EPA manual [Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations \(EPA/600/z-88/070, 1989\)](#). As part of the TRE, as required under the permit, the permittee shall develop and implement a *Detailed TRE Workplan* which shall include:

- Further actions undertaken by the permittee to investigate, identify and correct the causes of toxicity;
- Actions the permittee will take to mitigate the toxic impact of the effluent discharge and prevent the recurrence of toxicity; and
- A schedule for these actions.

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Notes:

Here is example permit language for initiating a Toxicity Reduction Evaluation, or TRE, if one of the required additional toxicity tests exceeds the WET permit limit or trigger. The text in blue represents options that a permit writer can select depending on whether an acute or short-term chronic WET permit limit or trigger was exceeded as well as whether the permitted facility is a municipal or industrial discharger.

Example Permit Language

Toxicity Identification Evaluation

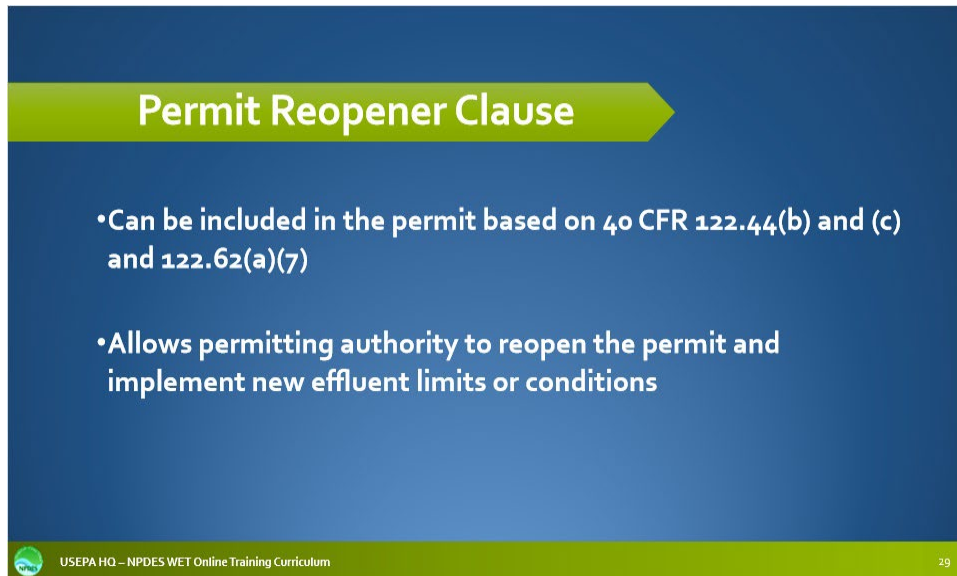
The permittee may initiate a Toxicity Identification Evaluation (TIE) as part of a TRE to identify the causes of toxicity using the same test species and toxicity test method and, as guidance, EPA TIE method manuals:

- *Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I* (EPA/600/6-91/005F, 1992)
- *Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/080, 1993)
- *Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/081, 1993)
- *Marine Toxicity Identification Evaluation (TIE): Phase I Guidance* (EPA/600/R-96-054, 1996)

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Notes:

This slide shows example permit language to be incorporated for initiating a Toxicity Identification Evaluation, or TIE, as part of the TRE. Various EPA TIE guidance manuals are available to support the permitted facility in their identification of the possible causes of measured toxicity, which can then help to resolve toxicity. The permit writer would select the appropriate guidance manuals to include in their permit language based on the specifics of the permitted facility, for example whether the discharge is to marine waters and whether acute or chronic toxicity impacts are being evaluated.



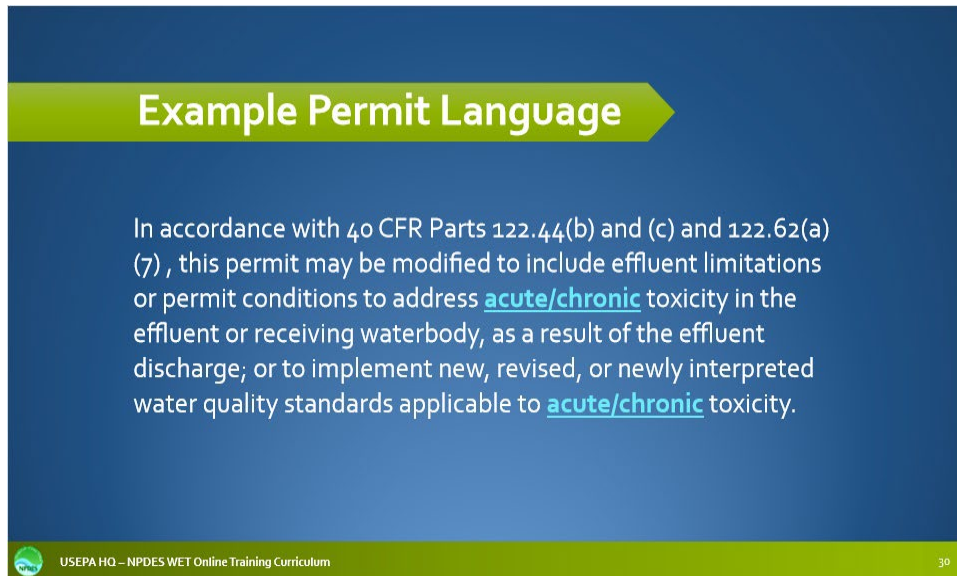
Permit Reopener Clause

- Can be included in the permit based on 40 CFR 122.44(b) and (c) and 122.62(a)(7)
- Allows permitting authority to reopen the permit and implement new effluent limits or conditions

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Notes:

Based on the federal regulations at 40 CFR 122.44(b) and (c) as well as 122.62(a)(7), NPDES permits can include a permit reopener condition. The inclusion of a permit reopener condition allows the permitting authority to reopen the permit and implement new effluent limits or conditions. This would apply to WET, for example, when the original permit contained a toxicity monitoring requirement but based on the valid toxicity data generated, toxicity causing an excursion of the applicable water quality standards was found. In this case, the permit could be reopened to include a WET permit limit if the permit reopener was included at permit issuance.



Example Permit Language

In accordance with 40 CFR Parts 122.44(b) and (c) and 122.62(a) (7), this permit may be modified to include effluent limitations or permit conditions to address acute/chronic toxicity in the effluent or receiving waterbody, as a result of the effluent discharge; or to implement new, revised, or newly interpreted water quality standards applicable to acute/chronic toxicity.

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Notes:

As noted in the previous slide, this slide contains permit language for incorporating a permit reopener clause to modify the permit to include an effluent limitation or permit condition to address toxicity. The text in blue represents permit language options that a permit writer could choose from depending on their specific permitting situation.

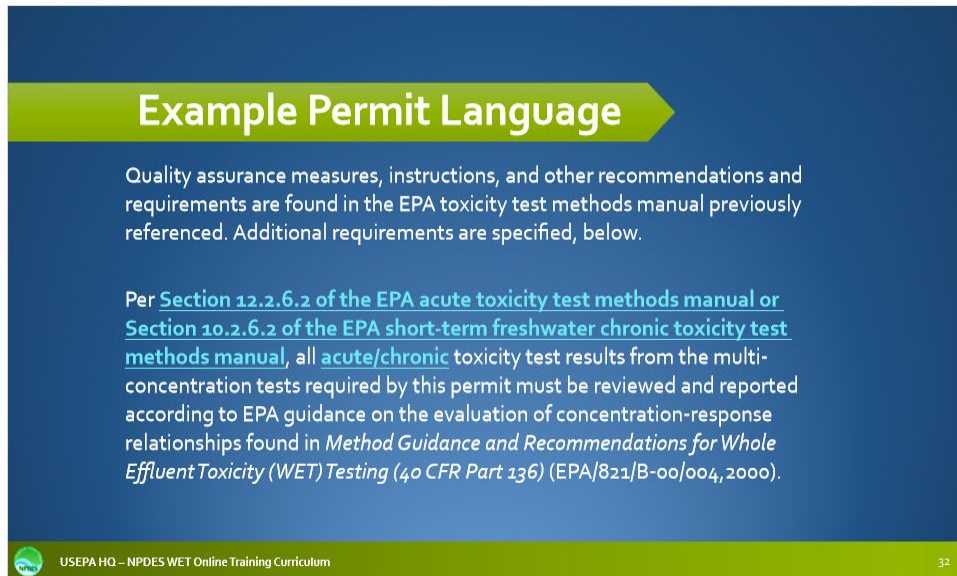
Other NPDES WET Permit Conditions

- Must meet required EPA toxicity test method mandates such as:
Test Acceptability Criteria (TAC) and required test conditions for each toxicity test method
 - TAC are mandatory requirements of the 2002 toxicity test methods (40 CFR Part 136) and the EPA 1995 West Coast toxicity test methods.
- Multi-concentration toxicity tests must be reviewed following the EPA WET Variability Guidance, EPA/821-B-00-004 (2000)
- Short-term chronic toxicity tests analyzed using NOEC for sub-lethal toxicity test endpoints should achieve percent minimum significant difference (PMSD) or minimum significant difference (MSD)

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Notes:

The NPDES Reviewing WET Tests and WET QA/QC module discusses test acceptability criteria, or TAC, for different EPA toxicity test methods. There are overall TAC, as well as specific TAC, for each toxicity test method which must be met. If these TAC are not met, the toxicity test is invalid and needs to be conducted again using a new sample. The NPDES permit should specify follow-up actions if toxicity test data are determined to be invalid. Where applicable, EPA also requires reviewing other aspects of the toxicity test such as the Percent Minimum Significant Difference or PMSD. Additionally, EPA also recommends reviewing the toxicity test water quality data, for example, dissolved oxygen levels, temperature, as well as sample chain of custody forms, and other aspects of the data as discussed in EPA's 2000 *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System*, hereafter EPA's WET Variability Guidance.



Example Permit Language

Quality assurance measures, instructions, and other recommendations and requirements are found in the EPA toxicity test methods manual previously referenced. Additional requirements are specified, below.

Per [Section 12.2.6.2 of the EPA acute toxicity test methods manual](#) or [Section 10.2.6.2 of the EPA short-term freshwater chronic toxicity test methods manual](#), all [acute/chronic](#) toxicity test results from the multi-concentration tests required by this permit must be reviewed and reported according to EPA guidance on the evaluation of concentration-response relationships found in *Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing* (40 CFR Part 136) (EPA/821/B-00/004,2000).

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Notes:

It is important that the permit instructs the permittee regarding quality assurance measures required in toxicity testing and reporting. Here is example permit language for incorporating quality assurance measures, instructions, and other recommendations and requirements that are found in the EPA toxicity test methods. This example provides suggested permit language regarding multi-concentration toxicity tests and the evaluation of the concentration-response relationship of the toxicity data generated. The text in blue represents permit language options that a permit writer can choose from depending on whether the NPDES permit requires acute or short-term chronic toxicity testing.


Example Permit Language

Short-term Freshwater Chronic

Because this permit requires chronic sub-lethal hypothesis testing endpoints from EPA toxicity test methods 1000.0, 1002.0, and 1003.0 in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002), with-in test variability must be reviewed for acceptability and variability criteria (upper and lower percent minimum significant difference [PMSD] bounds) must be applied, as directed under Section 10.2.8 - Test Variability of the EPA toxicity test methods manual *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*. Under Section 10.2.8, the calculated PMSD for both the reference toxicant test and effluent toxicity test results must be compared with the upper and lower PMSD bounds variability criteria specified in Table 6 - *Variability Criteria (Upper and Lower PMSD Bounds) for Sub-lethal Hypothesis Testing Endpoints Submitted Under NPDES Permits*, following the review criteria in Paragraphs 10.2.8.2.1 through 10.2.8.2.5 of the EPA toxicity test methods manual. Based on this review, only accepted effluent toxicity test results shall be reported on the Discharge Monitoring Report (DMR) form. If excessive within-test variability invalidates a toxicity test result, then the permittee must resample and conduct a new toxicity test within 14 days.

East Coast Marine
Short-term Chronic

West Coast Marine
Short-term Chronic

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Notes:

This example permit language can be used for incorporating the review of within-test variability as outlined in the EPA short-term chronic freshwater toxicity test methods manual and EPA's WET Variability Guidance.

Special Technical Considerations

When conducting toxicity tests, there can be special sample considerations to notify the permittee of and/or to address:

- Total residual chlorine (TRC)
- Ammonia and pH control

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Notes:

Two special technical considerations regarding NPDES effluent samples collected for toxicity testing, which have been raised by NPDES permitting authorities and their permittees, will be covered in the next few slides. These technical considerations involve how to conduct toxicity testing when there is either elevated total residual chlorine, TRC, or ammonia in the effluent sample.

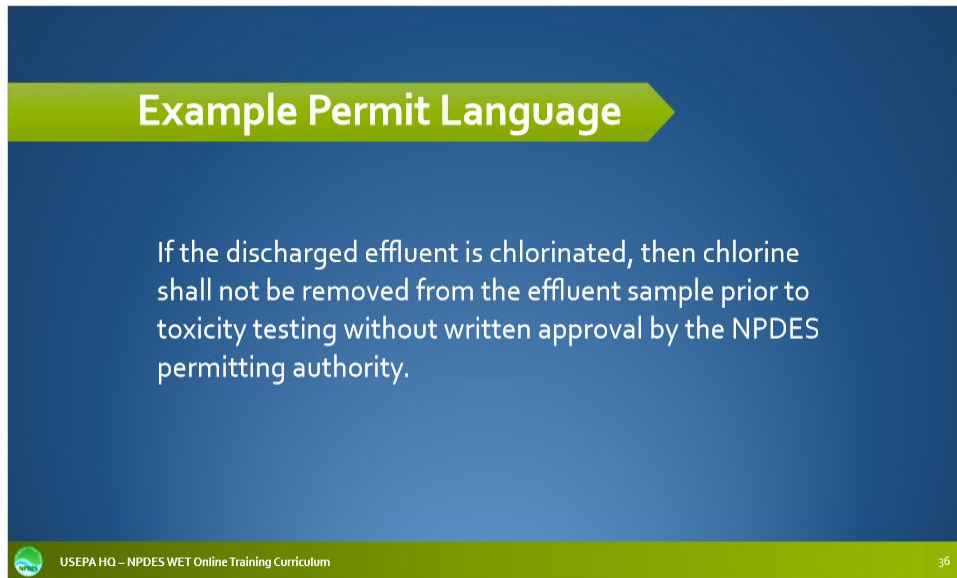
**Special Technical Considerations –
Total Residual Chlorine (TRC)**

- Sample must represent final effluent
- TRC must be measured in 100% effluent
- TRC must be measured immediately following sample collection
- TRC should be measured upon sample receipt in laboratory

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Notes:

To ensure a permit includes limits necessary to meet the applicable WET water quality standards, toxicity monitoring must represent the final permitted effluent discharged to the receiving waterbody. Representative effluent monitoring includes consideration of any chemicals added during the treatment process, including chlorine or other disinfectants, so that the final discharged effluent is used for toxicity tests. Total residual chlorine can be toxic to toxicity test species in low concentrations. EPA requires measuring TRC in the effluent sample immediately following collection and recommends measuring again upon arrival at the laboratory prior to toxicity testing. Regardless of whether TRC is observed in the effluent sample, the effluent sample should be tested for toxicity without adjusting for TRC. The effluent tested should not be altered as it would then no longer be representative of the final discharged effluent. The laboratory should record the effluent TRC concentration in the toxicity testing documentation.



Example Permit Language

If the discharged effluent is chlorinated, then chlorine shall not be removed from the effluent sample prior to toxicity testing without written approval by the NPDES permitting authority.


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Notes:

The example permit language on this slide can be used in NPDES permits for effluents that may have chlorine in the permitted effluent discharge and/or no dechlorination prior to discharge. The sample tested for WET under an NPDES permit should be taken from the effluent that is discharged to the receiving waterbody and should not be altered to remove chlorine.

Special Technical Considerations – Ammonia and pH Control

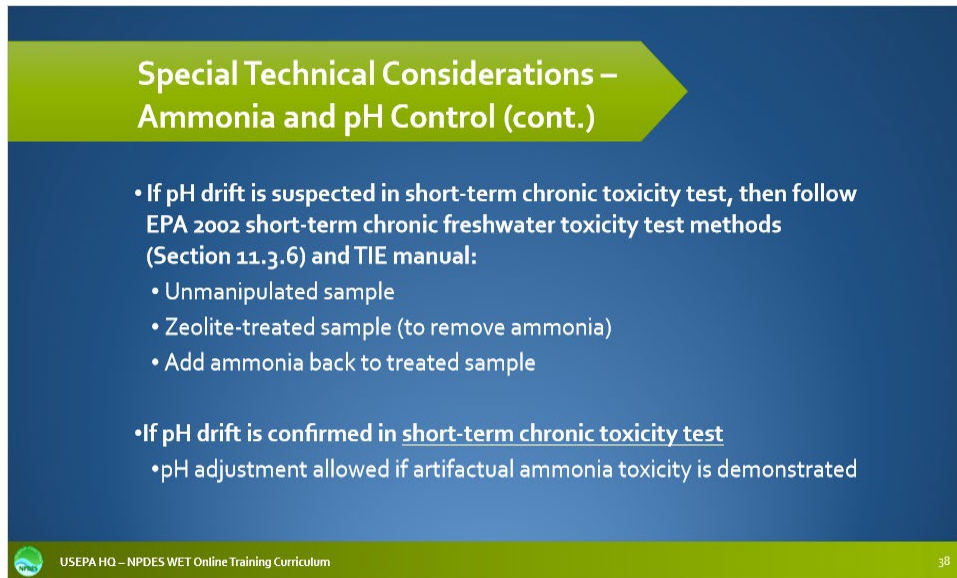
- Measure total ammonia, with pH and temperature, when toxicity from un-ionized ammonia is suspected
 - Total ammonia greater than 5 mg/L may lead to toxic concentrations of un-ionized ammonia at certain temperatures and pH
- If pH drifts in toxicity test, then:
 - Flow-through or static renewal testing procedures minimize drift, or
 - Use carbon dioxide (CO₂) in headspace of test chambers, or
 - Minimize headspace in test chambers and/or cover

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Notes:

Ammonia can present a different type of toxicity test challenge. EPA recommends measuring ammonia in the undiluted effluent sample upon receipt by the laboratory. Since ammonia toxicity is strongly influenced by pH, the likelihood of observing toxicity due to ammonia in a toxicity test will depend on the ammonia concentration and pH of the water in the toxicity test chambers. A higher pH in the test solutions will convert more of the ammonia to the un-ionized form of ammonia which is toxic to fish and other aquatic life. In some types of toxicity tests, the laboratory may observe an increase in the pH in test solutions over the course of the toxicity test. This is commonly referred to as pH drift and is often an artifact of the laboratory conditions and is not necessarily a reflection of what happens in the receiving waterbody. The pH drift is often more commonly observed in short-term chronic toxicity tests using fish as the test organisms rather than invertebrates such as *Ceriodaphnia* or water fleas. Also, it is more likely to occur during a static non-renewal toxicity test where fresh test solution is not being added periodically as it is done in flow-through or static-renewal toxicity tests. The EPA toxicity test methods provide several solutions for addressing pH drift, including increasing the exchange of fresh test solutions into toxicity test chambers, either by using more frequent renewals or flow-through toxicity test procedures; introducing carbon dioxide gas, CO₂, into the headspace, or area above the testing solution in the toxicity test chambers; or by simply minimizing the headspace in the test chambers and/or covering the test chambers to limit exchange with the atmosphere. Each of these suggested procedures will tend to stabilize the pH drift without resulting in other

chemical changes to the toxicity test sample. These procedures therefore maintain the representativeness of the toxicity test sample while correcting the issues associated with pH drift during the toxicity test.



Special Technical Considerations – Ammonia and pH Control (cont.)

- If pH drift is suspected in short-term chronic toxicity test, then follow EPA 2002 short-term chronic freshwater toxicity test methods (Section 11.3.6) and TIE manual:
 - Unmanipulated sample
 - Zeolite-treated sample (to remove ammonia)
 - Add ammonia back to treated sample
- If pH drift is confirmed in short-term chronic toxicity test
 - pH adjustment allowed if artifactual ammonia toxicity is demonstrated

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Notes:

If pH drift is observed in a short-term chronic toxicity test, pH adjustment of the effluent sample may be allowed if it is demonstrated that the pH drift is an artifact of the laboratory toxicity test conditions and is not occurring in the receiving waterbody. However, one of the recommended EPA toxicity test procedures for addressing pH drift, mentioned in the previous slide, should be used prior to considering pH adjustment of the effluent sample. EPA's freshwater short-term chronic toxicity test methods provide specific procedures, as noted in this slide, for identifying whether the observed toxicity is due to ammonia. These procedures are also discussed in EPA's Phase I and Phase II Toxicity Identification Evaluation, or TIE, manuals and EPA's Phase I short-term chronic TIE manual.

Example Permit Language

Acute Toxicity

Where total ammonia concentrations in the effluent are greater than 5 mg/L, toxicity may be contributed by un-ionized ammonia. pH drift during the toxicity test may contribute to artifactual toxicity when ammonia may be present. If total ammonia may be a potential toxicant and static toxicity tests are required, under authorization of the permitting authority, the permittee may conduct static renewal or flow-through toxicity, as outlined in Paragraph 9.5.9 of the EPA toxicity test methods manual.



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Notes:


Here is example permit language to include with respect to acute toxicity where total ammonia concentrations may be the cause of or contributing to observed toxicity in a toxicity test. Paragraph 9.5.9 of the EPA acute toxicity test methods manual indicates the use of static-renewal or flow-through toxicity testing to reduce the potential for pH drift.

Example Permit Language

Short-term Freshwater Chronic Toxicity Test

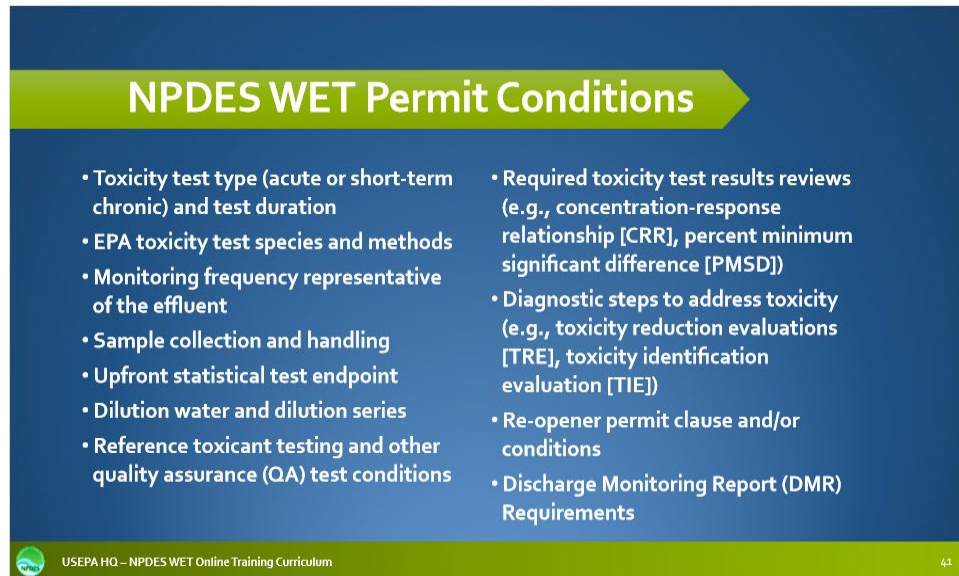
During the short-term chronic freshwater toxicity test, pH drift may contribute to artifactual toxicity when ammonia may be present in an effluent. To determine whether or not pH drift during the toxicity test is contributing to artifactual toxicity, the permittee shall conduct three sets of parallel toxicity tests, in which the pH of one treatment is controlled at the pH of the effluent and the pH of the other treatment is not controlled, as described in Section 11.3.6.1 of the EPA toxicity test methods manual, *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002). Toxicity is confirmed to be artifactual and due to pH drift when no toxicity above the chronic WET permit limit or trigger is observed in the treatments controlled at the pH of the effluent. If toxicity is confirmed to be artifactual and due to pH drift, then, following written approval by the permitting authority, the permittee may use the procedures outlined in Section 11.3.6.2 of the toxicity test methods manual to control sample pH during the toxicity test.

Short-term Chronic Marine Toxicity Tests for East Coast Facilities

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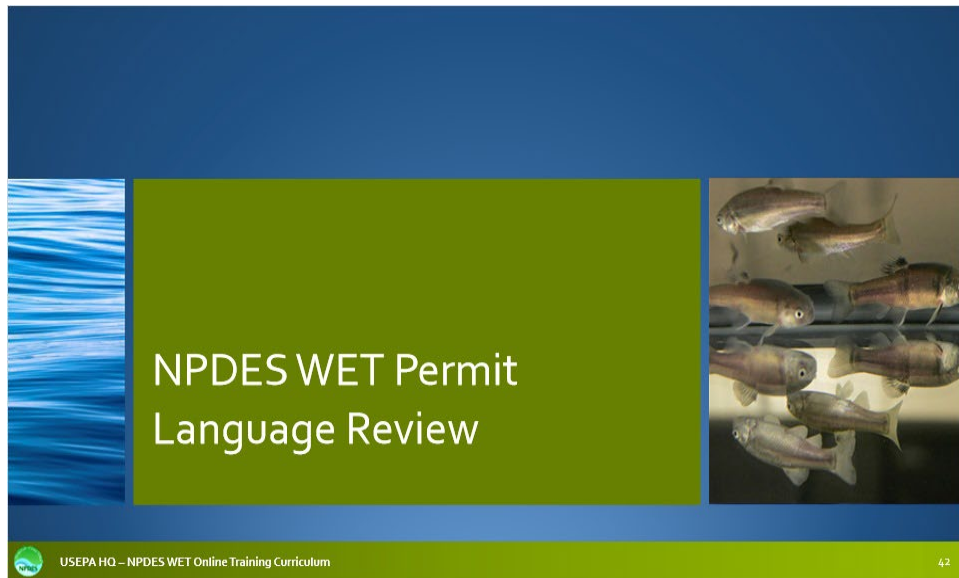
Notes:

Here is example permit language to include with respect to short-term freshwater chronic toxicity where total ammonia concentrations may be the cause of or contributing to observed toxicity in a toxicity test. Section 11.3.6.2 of the EPA freshwater short-term chronic toxicity test methods manual indicates the use of procedures to control sample pH drift during toxicity tests.

A presentation slide with a dark blue background and a green header bar. The title 'NPDES WET Permit Conditions' is in white text on the green bar. Below the title, there are two columns of bullet points in white text. The left column lists: Toxicity test type (acute or short-term chronic) and test duration; EPA toxicity test species and methods; Monitoring frequency representative of the effluent; Sample collection and handling; Upfront statistical test endpoint; Dilution water and dilution series; Reference toxicant testing and other quality assurance (QA) test conditions. The right column lists: Required toxicity test results reviews (e.g., concentration-response relationship [CRR], percent minimum significant difference [PMSD]); Diagnostic steps to address toxicity (e.g., toxicity reduction evaluations [TRE], toxicity identification evaluation [TIE]); Re-opener permit clause and/or conditions; Discharge Monitoring Report (DMR) Requirements. At the bottom left is a small green circular logo with 'USEPA' and the text 'USEPA HQ - NPDES WET Online Training Curriculum'. At the bottom right is the number '41'.

Notes:

In conclusion, NPDES permits that incorporate the permit conditions included in this slide and described in this module provide more clarity of the permit expectations for the permittee and establishes a well-written permit that is therefore more defensible for the permitting authority to use when discussing it with a permittee or for possible enforcement actions. Now let's take a look at some real world NPDES WET permit examples.



Notes:

The following examples will demonstrate some appropriate language to include with respect to certain NPDES WET permit conditions and some instances where the permit language could use some improvement.

The slide features a blue background with a green header bar containing the title "NPDES WET Permit Language Review". In the center, a white box displays an excerpt from a permit under the heading "e. Test Methods". The excerpt includes a sub-heading "1) Acute Toxicity Testing" and two paragraphs, A and B. Paragraph A references EPA publication EPA-821-R-02-012, "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (Fifth Edition), October 2002, or the most recent edition. Paragraph B states that tests shall provide a measure of acute toxicity as determined by wastewater concentration causing 50 percent mortality of organisms over a 48-hour period, with results expressed in terms of Lethal Concentration (LC) and reported as 48-hour LC50. A green arrow points from a box on the right, "Reference to the EPA toxicity test methods (40 CFR Part 136)", to the highlighted text in paragraph A. A red arrow points from a box on the left, "No recommended dilution series", to paragraph B. The bottom of the slide has a green bar with the text "USEPA HQ - NPDES WET Online Training Curriculum" and the number "43".

NPDES WET Permit Language Review

e. Test Methods

1) Acute Toxicity Testing

A) The acute toxicity tests shall be conducted in accordance with the EPA publication, EPA-821-R-02-012 Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fifth Edition), October 2002, or the most recent edition of this publication, if such edition is available

B) The tests shall provide a measure of the acute toxicity as determined by the wastewater concentration, which cause 50 percent mortality of the organisms over a 48 hour period. Test results shall be expressed in terms of *Lethal Concentration* (LC) and reported as 48 hour LC50.

Reference to the EPA toxicity test methods (40 CFR Part 136)

No recommended dilution series

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Notes:

This first example is from an NPDES permit which requires EPA acute toxicity testing. Highlighted is the reference in the permit to the use of EPA's 2002 toxicity test methods, which are required to be in permits either as a specific citation as shown here or incorporated by reference. We will illustrate "incorporation by reference" in one of the next permit language examples. Also highlighted here is the lack of a recommended toxicity test dilution series. The permit should contain either a specific reference to a recommended dilution series or how the dilution series should be constructed. In any case, one of the effluent WET test concentrations should be the in-stream waste concentration, or IWC. For example, the NPDES permit could list the actual toxicity test dilutions based on the IWC, of say 42 percent, so it could recommend a control, plus 10.5, 21, 42, 84, and 100 percent effluent. Or, similar to how this dilution series was constructed, the permit could specify that the dilution series should bracket the IWC of 42 percent by including a control, plus the following five effluent test concentrations: IWC/4, IWC/2, IWC, IWCx2, if less than 50 percent, and 100 percent effluent.

NPDES WET Permit Language Review

EPA requires algal cell density of $\geq 1 \times 10^6$ cells/ml

TEST ORGANISM	MINIMUM SURVIVAL	MINIMUM WEIGHT GAIN	MINIMUM FECUNDITY/ REPRODUCTION
<i>Pimephales promelas</i>	80%	0.25 mg avg	N/A
<i>Ceriodaphnia dubia</i>	80%	N/A	Average of ≥ 15 young per surviving female
<i>Selenastrum capricornutum</i>	Density $> 2 \times 10^5$ cells/ml	N/A	Variability in controls not to exceed 20%.

EPA also requires that 60% of surviving test organisms have three broods

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Notes:

In our second NPDES permit language example, we see a permit that includes the required EPA toxicity test method's Test Acceptability Criteria, or TAC, for the required short-term chronic freshwater tests including *Pimephales promelas*, or fathead minnows, *Ceriodaphnia dubia*, a water flea, and *Selenastrum capricornutum*, a green alga. Unfortunately, this permit did not include the correct TAC for two of the three toxicity test species.

In addition to the minimum reproduction requirement stated for the *Ceriodaphnia dubia* test, the short-term chronic sub-lethal TAC for *Ceriodaphnia dubia* also requires that 60 percent of the surviving toxicity test organisms have at least three broods of young, which is not stated in this example.

Additionally, the TAC listed for the green algae toxicity test is quite a bit lower than what is required by the EPA toxicity test methods. The TAC listed indicates that the controls must have a cell density greater than or equal to 200,000 cells per milliliter, but the actual EPA required toxicity test method's TAC is five times higher, at 1,000,000 cells per milliliter.

The slide features a dark blue background with a green header bar containing the title "NPDES WET Permit Language Review". Below the header, a white text box contains two numbered paragraphs. Callout boxes with arrows point to specific parts of the text: "Recommends dilution series" points to the dilution series in paragraph 6.4; "EPA recommends 24-hour composite samples" points to the crossed-out "grab samples" in paragraph 6.5; and "References allowable holding time" points to the "36 hours" in paragraph 6.5. The footer includes the USEPA logo, the text "USEPA HQ - NPDES WET Online Training Curriculum", and the page number "45".

NPDES WET Permit Language Review

Recommends dilution series

6.4 The static renewal chronic serial dilution tests of the effluent shall consist of a control, 12, 25, 50, 75 and 100% effluent. The Receiving Water Concentration (RWC) is equal to 98% wastewater for the purpose of evaluating compliance with water quality standards.

6.5 The wastewater samples shall be grab samples. The test solutions shall be renewed daily from each grab sample. Toxicity testing shall begin within 36 hours of sample collection. Receiving water collected from station SW004 shall be used for dilution and controls.

EPA recommends 24-hour composite samples

References allowable holding time

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Notes:

This section of NPDES permit language includes specific references to the EPA toxicity test method's required toxicity test dilution series and references the maximum allowable 36-hour holding time of the effluent sample for its first use in the toxicity test. The NPDES permit language indicates that the effluent samples will be grab samples, but EPA recommends the use of 24-hour composite samples for short-term chronic toxicity testing unless specific NPDES facility discharge information, that has been documented in the NPDES permit or factsheet, indicates that grab samples may yield a better representation of the effluent exposure to aquatic organisms in the receiving waterbody.

NPDES WET Permit Language Review

MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>October 28, 2006</u> .				
Whole Effluent Toxicity (WET) Test	% Survival	See Special Conditions	twice/year in August & January	24 hr. composite
LC ₅₀	%	Less than 11.5%	twice/year in August & January	24 hr. composite
B. STANDARD CONDITIONS				
IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED <u>Parts I, II & III</u> STANDARD CONDITIONS DATED <u>October 1, 1980 and August 15, 1994</u> , AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.				

Permit requires effluent to be acutely toxic!

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Notes:

This example of NPDES permit language incorporates an acute WET permit limit using a lethal concentration to 50 percent of the test organisms, or LC₅₀, measured as percent effluent but indicates that the test endpoint must be less than 11.5 percent. Remember, the lower the LC₅₀, the more toxic the effluent sample. So, this requirement is essentially requiring the effluent to be acutely toxic! In this case, the NPDES WET permit limit should indicate that the LC₅₀ must be greater than 11.5 percent effluent.

The slide is titled "NPDES WET Permit Language Review" in a green header. It features a white text box with permit language. Two red callout boxes highlight specific parts: one at the top right pointing to the phrase "or the most recent update thereof" in the *Ceriodaphnia dubia* test description, and another at the bottom pointing to the word "lethality" in the NOEC definition. The slide footer includes the USEPA logo, "USEPA HQ - NPDES WET Online Training Curriculum", and the number "47".

NPDES WET Permit Language Review

Permit recommends out of date EPA toxicity test methods! (Although current EPA toxicity test methods are incorporated by reference).

Ceriodaphnia dubia chronic static renewal survival and reproduction test, Method 1002.0, EPA/600/4-89/001 or the most recent update thereof. This test should be terminated when 60% of the surviving organisms in the control produce three broods. If these criteria are not met at the end of 8 days, the test must be repeated.

Pimephales promelas (Fathead minnow) chronic static renewal 7-day larval survival and growth test, Method 1000.0, EPA/600/4-91/002, or the most recent update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

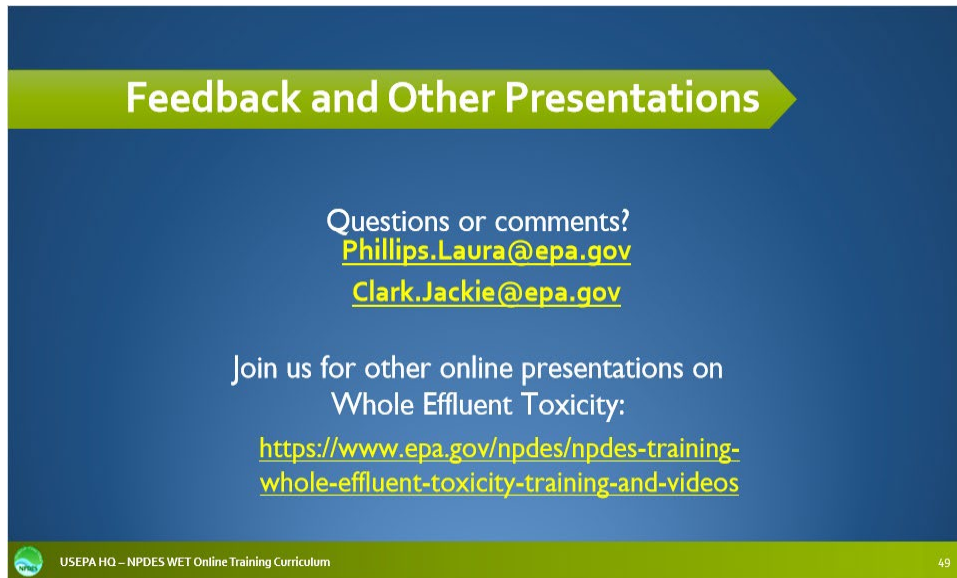
7. The NOEC (No Observed Effect Concentration) is defined as the greatest effluent dilution which does not result in lethality that is statistically different from the control (0% effluent) at the 95% confidence level.

Short-term chronic toxicity is not just lethality!
Sub-lethal test endpoints are required!

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Notes:


The last example of NPDES permit language indicates a specific reference to out-of-date EPA toxicity test methods. In this example, EPA's prior 1989 toxicity test methods guidance are included, but it does incorporate the 2002 EPA toxicity test methods by stating "or the most recent update thereof." Thus, although the NPDES permit specifically cites the older EPA toxicity test methods, the permittee is still required to use the most recent update to those EPA toxicity test methods, in this case the EPA 2002 toxicity test methods. Referring to the "most recent update" in the permit language is one way to incorporate the most recent EPA toxicity test methods by reference. The last point to make on this final permit language example is that the permit specifies that the No Observed Effect Concentration, or NOEC, is applicable only to the lethality test endpoint. As noted, short-term chronic toxicity is not just measured using lethality but also using sub-lethal test endpoints. In this example, NOECs for reproduction and growth must be included as part of the NPDES permit so that both the permittee and its toxicity testing laboratory are aware of what is being required under the NPDES permit.



Feedback and Other Presentations

Questions or comments?
Phillips.Laura@epa.gov
Clark.Jackie@epa.gov

Join us for other online presentations on
Whole Effluent Toxicity:
<https://www.epa.gov/npdes/npdes-training-whole-effluent-toxicity-training-and-videos>

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Notes:

Thank you for joining us for this EPA's NPDES Whole Effluent Toxicity training presentation. We hope that you have enjoyed it!

If you have any questions or comments on this or any part of the EPA's NPDES WET online training curriculum, click on the email address given on this slide to send a message to Laura Phillips or Jackie Clark, EPA Headquarters NPDES WET Coordinators.


Remember, you will find all the EPA's NPDES WET online training presentations, under the EPA's NPDES training section found on the Office of Wastewater Management's NPDES website.

See you next time!

**East Coast Marine Short-term Chronic Toxicity
Biological Test Endpoints**

Biological test endpoints are:

- mortality/immobility (lethal),
- growth, teratogenicity, reproduction, fertilization, or development (sub-lethal)

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Notes:

For EPA East Coast marine short-term chronic toxicity tests, the toxicity test endpoints include lethal endpoints measured as mortality or immobility, as well as sub-lethal endpoints measured as growth, teratogenicity, reproduction, fertilization, or development.

**West Coast Marine Short-term Chronic Toxicity
Biological Test Endpoints**

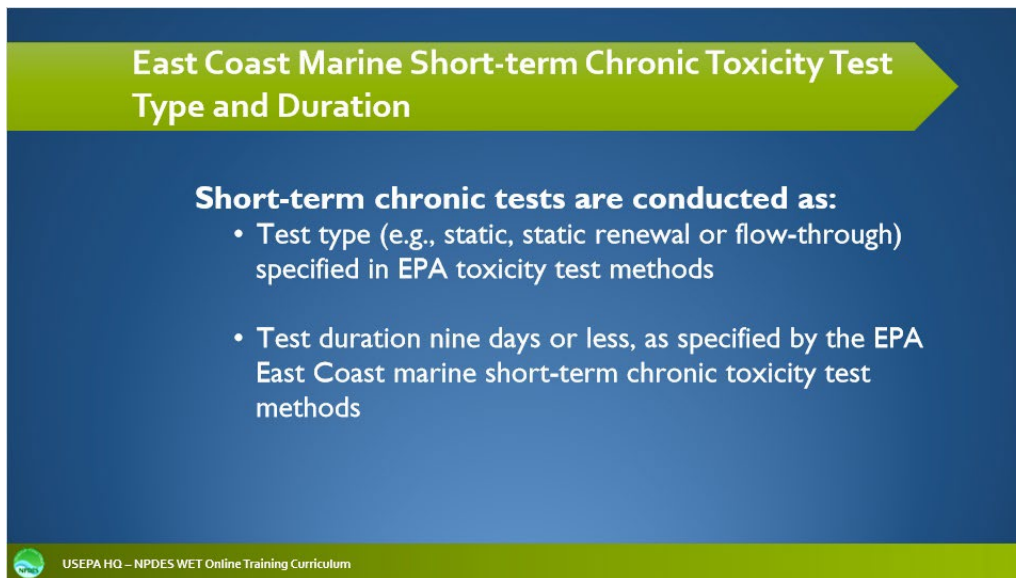
Biological test endpoints are:

- mortality/immobility (lethal),
- growth, length, germination, fertilization, or development (sub-lethal)

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Notes:

For EPA West Coast marine short-term chronic toxicity tests, the toxicity test endpoints include lethal endpoints measured as mortality or immobility, as well as sub-lethal endpoints, measured as growth, length, germination, fertilization, or development.



East Coast Marine Short-term Chronic Toxicity Test Type and Duration

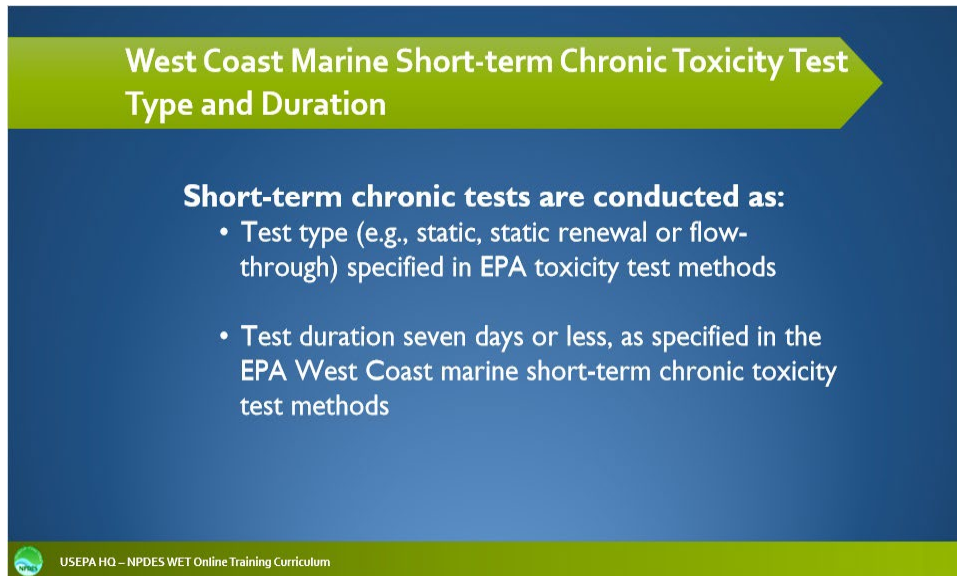
Short-term chronic tests are conducted as:

- Test type (e.g., static, static renewal or flow-through) specified in EPA toxicity test methods
- Test duration nine days or less, as specified by the EPA East Coast marine short-term chronic toxicity test methods

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Notes:


For EPA East Coast marine short-term chronic toxicity tests, the test type, for example static, static renewal, or flow-through, is specified in the EPA toxicity test methods, and the test duration is no longer than nine days, as specified by the EPA toxicity test method.



West Coast Marine Short-term Chronic Toxicity Test Type and Duration

Short-term chronic tests are conducted as:

- Test type (e.g., static, static renewal or flow-through) specified in EPA toxicity test methods
- Test duration seven days or less, as specified in the EPA West Coast marine short-term chronic toxicity test methods

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Notes:

For EPA West Coast marine short-term chronic toxicity tests, the test type, for example static, static renewal, or flow-through, is specified in the EPA toxicity test methods, and the test duration is no longer than seven days, as specified in the EPA West Coast marine short-term chronic toxicity test methods.

The slide features a green header with the title "EPA Acute and Chronic Freshwater Toxicity Test Methods". Below the header, there are two main content areas. The left area displays the cover of the "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition, October 2002", which includes illustrations of various aquatic organisms like daphnia, fish, and snails. The right area displays the cover of the "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, October 2002", which includes a graph and photographs of natural water environments. To the right of these covers, there are two text boxes: one with the instruction "Click Resources Tab in the top menu to access these manuals." and another blue button that says "Click Here for EPA Acute and Chronic Marine Toxicity Test Methods". At the bottom left of the slide, there is a small EPA logo and the text "USEPA HQ - NPDES WET Online Training Curriculum".

EPA Acute and Chronic Freshwater Toxicity Test Methods

Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms
Fifth Edition
October 2002

Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms
Fourth Edition
October 2002

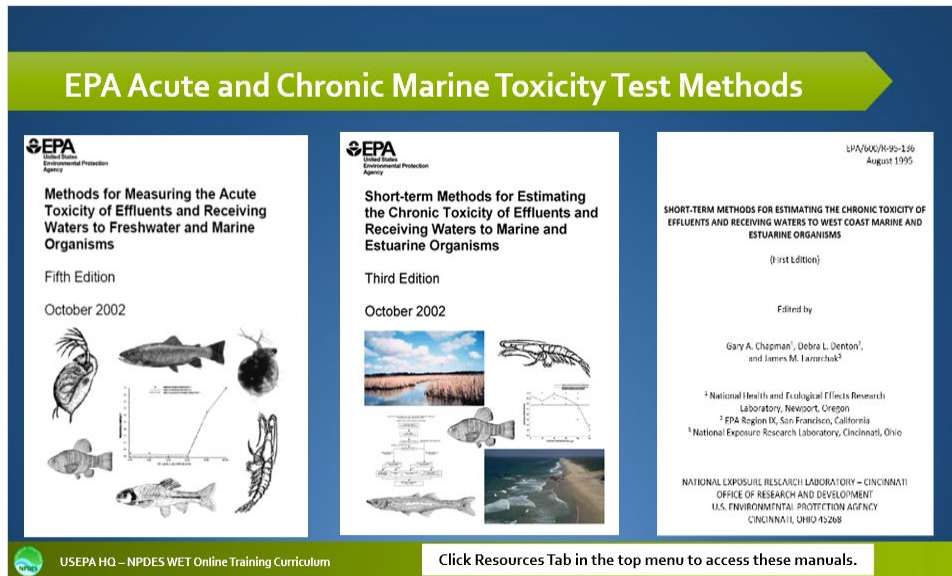
Click Resources Tab in the top menu to access these manuals.

[Click Here for EPA Acute and Chronic Marine Toxicity Test Methods](#)

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Notes:

The module presented here examines EPA's freshwater acute toxicity test methods entitled *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition, EPA-821-R-02-012, hereafter acute toxicity test methods. In addition, this module provides EPA's short-term chronic freshwater toxicity test methods entitled *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA-821-R-02-013, hereafter chronic toxicity test methods.



Notes:

This course also provides an opportunity to view EPA's acute marine toxicity test methods entitled *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition, EPA-821-R-02-012, hereafter acute toxicity test methods; short-term chronic marine toxicity test methods used by states on the Atlantic Ocean or Gulf of Mexico entitled *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, Third Edition, EPA-821-R-02-014, hereafter East Coast chronic toxicity test methods; or short-term chronic marine toxicity test methods used by states on the Pacific Ocean entitled *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, First Edition, EPA-600-R-95-136, hereafter West Coast chronic toxicity test methods.

Example Permit Language


East Coast Marine Acute

Species and test methods for estimating the acute toxicity of NPDES effluents are found in the fifth edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002; Table IA, 40 CFR Part 136). The permittee shall conduct 48-hour or 96-hour; static or static renewal toxicity tests with the following vertebrate species:

- The inland silverside, *Menidia beryllina*; Atlantic silverside, *Menidia menidia*; or tidewater silverside, *Menidia peninsulae* (Acute Toxicity Test Method 2006.o);
- The sheepshead minnow, *Cyprinodon variegatus* (Acute Toxicity Test Method 2004.o);

And the following invertebrate species:

- The mysid, *Americamysis bahia* (Acute Toxicity Test Method 2007.o).

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Notes:

On this slide is example permit language for incorporating East Coast marine acute toxicity testing methods. Text in blue represents language choices that a permit writer can use to require different toxicity test durations, types of test exposure, and toxicity test species, as specified by the EPA toxicity test method.

Example Permit Language


West Coast Marine Acute

Species and test methods for estimating the acute toxicity of NPDES effluents are found in the fifth edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002; Table IA, 40 CFR Part 136). The permittee shall conduct 48-hour or 96-hour; static or static renewal toxicity tests with the following vertebrate species:

- The topsmelt, *Atherinops affinis*, Larval Survival and Growth Test Method 1006.01 in the first edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995) (specific to Pacific Coast waters);

And the following invertebrate species:

- The West Coast mysid, *Holmesimysis costata* (Table 19 in the acute test methods manual) (specific to Pacific Coast waters)

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Notes:

On this slide is example permit language for incorporating West Coast marine acute toxicity testing methods. Text in blue represents language choices that a permit writer can use to require different toxicity test durations, types of test exposures, and toxicity test species, as specified in the EPA West Coast marine short-term chronic toxicity test methods.

Example Permit Language

Short-term Marine Chronic for East Coast Facilities

Species and short-term test methods for estimating the chronic toxicity of NPDES effluents are found in the third edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (EPA/821/R-02/014, 2002; Table 1A, 40 CFR Part 136).

The permittee shall conduct:


- A static non-renewal toxicity test with the red macroalga, *Champia parvula* (Sexual Reproduction Test Method 1009.0);

A toxicity test with one of the following vertebrate species:

- A static renewal toxicity test with sheepshead minnow, *Cyprinodon variegatus* (Larval Survival and Growth Test Method 1004.0); or,
- A static renewal toxicity test with sheepshead minnow, *Cyprinodon variegatus* (Embryo-Larval Survival and Teratogenicity Test Method 1005.0); or,
- A static renewal toxicity test with the inland silverside, *Menidia beryllina* (Larval Survival and Growth Test Method 1006.0);

And a toxicity test with one of the following invertebrate species:

- Static renewal toxicity test with the mysid, *Americamysis bahia* (formerly *Mysidopsis bahia* Survival, Growth, and Fecundity Test Method 1007.0); or,
- Static non-renewal toxicity test with the purple sea urchin, *Arbacia punctulata* (Fertilization Test Method 1008.0)

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Notes:

On this slide is example permit language for incorporating short-term marine chronic toxicity testing methods for East Coast facilities. Text in blue represents language choices that a permit writer can use to require different toxicity test species. The toxicity test exposure type and test duration are specified in each EPA toxicity test method.

Example Permit Language

Short-term Marine Chronic for West Coast Facilities


Species and short-term test methods for estimating the chronic toxicity of NPDES effluents are found in the first edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995) and applicable water quality standards; see 40 CFR Part 122.21(j)(5)(viii) for POTWs.

The permittee shall conduct:

- A static renewal toxicity test with topsmelt, *Atherinops affinis* (Larval Survival and Growth Test Method);
- A static non-renewal toxicity test with the giant kelp, *Macrocystis pyrifera* (Germination and Growth Test Method);

And a toxicity test with one of the following invertebrate species:

- **Static renewal toxicity test with the mysid, *Holmesimysis costata* (Survival and Growth Test Method 1007.01);**
- **Static non-renewal toxicity test with the Pacific oyster, *Crassostrea gigas*, or the mussel, *Mytilus* spp., (Embryo-larval Shell Development Test Method);**
- **Static non-renewal toxicity test with the red abalone, *Haliotis rufescens* (Larval Shell Development Test Method);**
- **Static non-renewal toxicity test with the purple sea urchin, *Strongylocentrotus purpuratus*, or the sand dollar, *Dendraster excentricus* (Embryo-larval Development Test Method); or**
- **Static non-renewal toxicity test with the purple sea urchin, *Strongylocentrotus purpuratus*, or the sand dollar, *Dendraster excentricus* (Fertilization Test Method).**

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Notes:

On this slide is example permit language for incorporating short-term marine chronic toxicity testing methods for West Coast facilities. Text in blue represents language choices that a permit writer can use to require different toxicity test species. The toxicity test exposure type and test duration are specified in each EPA toxicity test method.

Example Permit Language

West Coast Marine Acute

Effluent dilution water and control water should be prepared and used as specified in the toxicity test methods manual [Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms \(EPA/821/R-02/012, 2002\)](#) and/or for [Atherinops affinis, Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms \(EPA/600/R-95/136, 1995\)](#). If the dilution water is different from the test organism culture water, then a second control using culture water shall be used. If the use of artificial sea salts is not an option under the toxicity test method, then artificial sea salts shall not be used to increase the salinity of the effluent sample prior to toxicity testing without written approval by the permitting authority.



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Notes:

Example permit language for incorporating the recommended dilution water for West Coast marine acute toxicity testing is presented on this slide. For West Coast permitted facilities, a permit writer may include toxicity test methods and test species based on either the acute toxicity test methods manual or the topsmelt (*Atherinops affinis*) toxicity test method included in the EPA West Coast marine short-term chronic toxicity test methods.

Example Permit Language

Short-term Marine Chronic for East Coast Facilities

Effluent dilution water and control water should be prepared and used as specified in the toxicity test methods manual *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (EPA/821/R-02/014, 2002). If the dilution water is different from the test organism culture water, then a second control using culture water shall be used. If the use of artificial sea salts is not an option under the toxicity test method, then artificial sea salts shall not be used to increase the salinity of the effluent sample prior to toxicity testing without written approval by the permitting authority.



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Notes:

For incorporating the recommended dilution water for short-term chronic marine toxicity testing for East Coast permitted facilities, a permit writer may use the example permit language presented here.

Example Permit Language

Short-term Marine Chronic for West Coast Facilities

Effluent dilution water and control water should be prepared and used as specified in the toxicity test methods manual *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995). If the dilution water is different from the test organism culture water, then a second control using culture water shall also be used. If the use of artificial sea salts is not an option under the toxicity test method, then artificial sea salts shall not be used to increase the salinity of the effluent sample prior to toxicity testing without written approval by the permitting authority



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Notes:

For incorporating the recommended dilution water for short-term chronic marine toxicity testing for West Coast permitted facilities, a permit writer may use the example permit language presented here.

Example Permit Language

Short-term Marine Chronic for East Coast Facilities

Because this permit requires chronic sub-lethal hypothesis testing endpoints from EPA toxicity test methods 1006.0 and 1007.0 in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (EPA/821/R-02/014, 2002), with-in test variability must be reviewed for acceptability and variability criteria (upper and lower percent minimum significant difference [PMSD] bounds) must be applied, as directed under Section 10.2.8 - Test Variability of the EPA toxicity test methods manual *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*. Under Section 10.2.8, the calculated PMSD for both the reference toxicant test and effluent toxicity test results must be compared with the upper and lower PMSD bounds variability criteria specified in Table 6 - *Variability Criteria (Upper and Lower PMSD Bounds) for Sub-lethal Hypothesis Testing Endpoints Submitted Under NPDES Permits*, following the review criteria in Paragraphs 10.2.8.2.1 through 10.2.8.2.5 of the EPA toxicity test methods manual. Based on this review, only accepted effluent toxicity test results shall be reported on the Discharge Monitoring Report (DMR) form. If excessive within-test variability invalidates a toxicity test result, then the permittee must resample and conduct a new toxicity test within 14 days.



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Notes:

Here is example permit language for incorporating the review of within-test

Example Permit Language

Slide 1 of 2

Short-term Marine Chronic for West Coast Facilities
Because this permit requires chronic sub-lethal hypothesis testing endpoints from EPA toxicity test methods in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995), with-in test variability must be reviewed for acceptability and variability criteria (upper PMSD bound) must be applied, as directed under each toxicity test method. Based on this review, only accepted effluent toxicity test results shall be reported on the Discharge Monitoring Report (DMR) form. If excessive within-test variability invalidates a toxicity test result, then the permittee must resample and conduct a new toxicity test within 14 days.

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Notes:


Here is example permit language for incorporating the review of within-test variability as outlined in the EPA short-term chronic marine toxicity test methods for West Coast facilities.

Example Permit Language

Short-term Marine Chronic for West Coast Facilities - Topsmelt

Because this permit requires chronic sub-lethal hypothesis testing endpoints from EPA toxicity test method 1006.0 in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (EPA/821/R-02/014, 2002), with-in test variability must be reviewed for acceptability and variability criteria (upper and lower PMSD bounds) must be applied, as directed under Section 10.2.8 - Test Variability of the EPA toxicity test methods manual *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*. Under Section 10.2.8, the calculated percent minimum significant difference (PMSD) for both the reference toxicant test and effluent toxicity test results must be compared with the upper and lower PMSD bounds variability criteria specified in Table 6 - *Variability Criteria (Upper and Lower PMSD Bounds) for Sub-lethal Hypothesis Testing Endpoints Submitted Under NPDES Permits*, following the review criteria in Paragraphs 10.2.8.2.1 through 10.2.8.2.5 of the toxicity test methods manual. Based on this review, only accepted effluent toxicity test results shall be reported on the Discharge Monitoring Report (DMR) form. If excessive within-test variability invalidates a toxicity test result, then the permittee must resample and conduct a new toxicity test within 14 days.

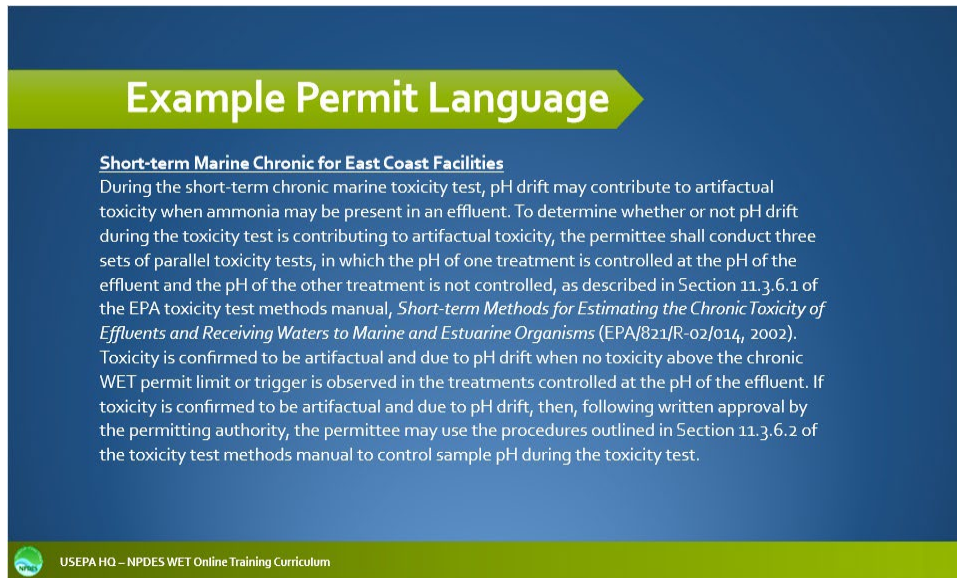
Slide
2 of 2



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Notes:


Here is example permit language for incorporating the review of within-test variability as outlined in the EPA short-term chronic marine toxicity test methods for West Coast facilities when topsmelt testing is included in the permit.



Example Permit Language

Short-term Marine Chronic for East Coast Facilities

During the short-term chronic marine toxicity test, pH drift may contribute to artifactual toxicity when ammonia may be present in an effluent. To determine whether or not pH drift during the toxicity test is contributing to artifactual toxicity, the permittee shall conduct three sets of parallel toxicity tests, in which the pH of one treatment is controlled at the pH of the effluent and the pH of the other treatment is not controlled, as described in Section 11.3.6.1 of the EPA toxicity test methods manual, *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (EPA/821/R-02/014, 2002). Toxicity is confirmed to be artifactual and due to pH drift when no toxicity above the chronic WET permit limit or trigger is observed in the treatments controlled at the pH of the effluent. If toxicity is confirmed to be artifactual and due to pH drift, then, following written approval by the permitting authority, the permittee may use the procedures outlined in Section 11.3.6.2 of the toxicity test methods manual to control sample pH during the toxicity test.

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Notes:

Here is example permit language to include with respect to East Coast marine short-term chronic toxicity where total ammonia concentrations may be the cause of or contributing to observed toxicity in the toxicity test. The EPA East Coast marine short-term chronic toxicity test methods provide the procedures to use to control sample pH drift during toxicity tests.