Toxicity Provisions

Proposed Toxicity Provision to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California

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State Water Resources Control Board

October 2018
Background

- WQO 2003-0012 stated that numeric effluent limitations for chronic toxicity should be considered in a regulatory setting
- Resolutions 2003-0070 and 2005-0019 direct staff to amend the State Implementation Policy to address narrative toxicity control provisions
- October 2010 – Draft Policy released for comment
- November 2010 – Public workshop on the draft Policy
- July 2011 – TST Test Drive Report released
- June 2012 – Revised draft Policy was released for comment
- August 2012 – Public Hearing on revised draft Policy
- 2012 to present
  - Revised Policy to a statewide Water Quality Control Plan (Toxicity Provisions)
  - Significant revisions to provisions
  - Thorough analysis in staff report
  - Several Regional Water Boards incorporate TST into permits
- October 2018 – Released Toxicity Provisions for comment

Goals

1. Adopt consistent, statewide numeric water quality objectives for acute and chronic toxicity
2. Adopt a program of implementation
3. Create a consistent, yet flexible framework for monitoring toxicity and laboratory analysis
4. Incorporate a statewide statistical approach to analyze test results that will provide a transparent determination of toxicity
Toxicity Provisions

• Establish statewide numeric water quality toxicity objectives
• Apply to inland surface waters and enclosed bays and estuaries designated to protect aquatic life beneficial uses
• Establish program of implementation
• Supersede portions of Basin Plans that:
  • Specify methods compliance with water quality objectives for chronic or acute toxicity
  • Address toxicity testing and data interpretation
  • Are in conflict with Toxicity Provisions
• Supersede section 4 of the State Implementation Policy
• Do not supersede narrative toxicity water quality objectives, site specific water quality objectives, or chemical specific limitations
Numeric Chronic Aquatic Toxicity Objective

Null Hypothesis ($H_0$): 

$\text{Mean Response (ambient receiving water)} \leq 0.75 \times \text{Mean Response (control)}$

Numeric Acute Aquatic Toxicity Objective

Null Hypothesis ($H_0$):

$\text{Mean Response (ambient receiving water)} \leq 0.80 \times \text{Mean Response (control)}$
Toxicity tests shall be conducted using one or more test species in Table 1 of the Toxicity Provisions.

Methods shall follow EPA method manuals.

- Fathead Minnow
- Green Algae (Selenastrum)
- Water flea (Ceriodaphnia)
Test of Significant Toxicity

- A statistical hypothesis test
- Data analysis approach, not a change to test methods
- Developed by the U.S. EPA
- Tests the hypothesis: “does the effluent concentration of concern (e.g., IWC) and the control differ by a biologically significant amount?”
- Produces a clear pass/fail result
- Provides greater confidence
- Incorporates the regulatory management decision (RMD)
TST Compared to other Data Analysis Approaches

NOEC – No Observed Effect Concentration
LOEC – Lowest Observed Effect Concentration
LC50 – Lethal Concentration at which there is 50% mortality of exposed organisms
Test Drive: Test of Significant Toxicity

- The validity of the TST was evaluated by the U.S. EPA TST Test Drive and the California TST Test Drive

- California TST Test Drive
  - Test results using the TST and the current NOEC approach were generally the same overall, indicating the use of the TST is not expected to change the number of exceedances

- Experience with the TST
  - 5 of 9 Regional Water Boards use the TST in NPDES permits
  - Regions 4 and 9 establish effluent limitation similar to the proposed Provisions
Program of Implementation

- Non-Stormwater NPDES Dischargers
  - Species Sensitivity Screening
  - Reasonable Potential Analysis
  - Routine Monitoring Frequency
  - Effluent Limitations
  - Toxicity Reduction Evaluation
  - Additional Considerations

- Storm Water and Nonpoint Source Dischargers
Program of Implementation

Implementation for Non-Stormwater NPDES Dischargers
Species Sensitivity Screening

- Screening conducted as follows:
  - Chronic Testing - at least one vertebrate, one invertebrate and one aquatic plant species
  - Acute Testing – at least a vertebrate and invertebrate species
- Four sets of tests must be conducted over one year (or applicable discharge season)
- Required either prior to issuance of permit or within 18 months after first issuance
- No less than once every 10 years
- Species with highest percent effect at the Instream Waste Concentration is generally selected as most sensitive
Reasonable Potential Analysis

• Reasonable potential exists if:
  • Any toxicity test results in a “fail” of the TST or
  • If the percent effect is greater than 10% at the instream waste concentration

• All data generated in the previous 5 years must be evaluated
• Older data may also be used
• A minimum of four test must be evaluated using the TST
• If reasonable potential exists, the permit must include numeric effluent limitations and routine monitoring for toxicity

• POTW dischargers authorized to discharge greater than 5 MGD:
  • Do not have to conduct a reasonable potential analysis
  • Will have numeric effluent limitations and toxicity monitoring requirements in their permit
## Routine Monitoring Frequency

<table>
<thead>
<tr>
<th></th>
<th>POTWs ≥ 5 MGD</th>
<th>Other NPDES Dischargers ≥ 5 MGD w/ RP</th>
<th>POTWs &lt; 5 MGD w/ RP</th>
<th>Other NPDES Dischargers &lt; 5 MGD w/ RP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chronic Toxicity Frequency</strong></td>
<td>Monthly</td>
<td>Monthly</td>
<td>Quarterly</td>
<td>Quarterly</td>
</tr>
<tr>
<td><strong>Acute Toxicity Frequency</strong></td>
<td>Determined by Regional Water Board but at least annually</td>
<td>Determined by Regional Water Board but at least annually</td>
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<td>Determined by Regional Water Board but at least annually</td>
</tr>
</tbody>
</table>
Chronic Toxicity Maximum Daily Effluent Limitation

No Chronic Toxicity Test* shall result in a “fail” at the IWC for the sub-lethal endpoint measured in the test and a Percent Effect for the survival endpoint greater than or equal to 50%.

Or if no survival endpoint can be measured, then:

No Chronic Toxicity Test* shall result in a “fail” at the IWC for the sub-lethal endpoint measured in the test and a Percent Effect for the sub-lethal endpoint greater than or equal to 50%.

Chronic Toxicity Monthly Median Effluent Limitation

No more than one Chronic Toxicity Test* initiated in a Calendar Month may result in a “fail” at the IWC for any endpoint.

* Using the most sensitive species
Acute Toxicity Maximum Daily Effluent Limitation

No Acute Toxicity Test* may result in a “fail” at the IWC for the survival endpoint and a Percent Effect for the survival endpoint greater than or equal to 50%

Acute Toxicity Monthly Median Effluent Limitation

No more than one Acute Toxicity Test* initiated in a Calendar Month may result in a “fail” at the IWC for the survival endpoint

* Using the most sensitive species
<table>
<thead>
<tr>
<th>Routine Monitoring Test</th>
<th>Compliance Test 1</th>
<th>Compliance Test 2</th>
<th>MMEL Violation?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>NA</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Fail</td>
<td>Pass</td>
<td>Pass</td>
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<tr>
<td>Fail</td>
<td>Pass</td>
<td>Fail</td>
<td>Yes</td>
</tr>
<tr>
<td>Fail</td>
<td>Fail</td>
<td>NA</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Toxicity Reduction Evaluation (TRE) is required when two violations of either effluent limitation occurs within a Calendar Month or in consecutive Calendar Months.

- Routine monitoring shall continue during a TRE.*
- Regional Water Boards have discretion to require a TRE if other information (i.e., fish kills) indicates toxicity.

* The Permitting Authority may reduce the routine monitoring frequency.
Other Considerations

- Mixing zones and dilution credits
- Flow-through acute toxicity testing systems
- Additional monitoring
- Violation reporting
- Exceptions for small disadvantaged communities and insignificant dischargers
Storm Water & Nonpoint Source Dischargers

- Water Boards have discretion to require toxicity testing using any species.
- Storm Water or Nonpoint source dischargers with existing chronic or acute toxicity monitoring requirements using the testing species in Table 1 of the Toxicity Provisions will be required to use the TST statistical approach to analyze the data.
- Any future requirements for testing with the species in Table 1 also will be required to use the TST statistical approach.
### 6. Timeline

<table>
<thead>
<tr>
<th>Item</th>
<th>Projected Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Comment Period</td>
<td>Release on 10/19/2018 Close on 12/7/18</td>
</tr>
<tr>
<td>Board Hearing for Public Comment</td>
<td>11/28/2018</td>
</tr>
<tr>
<td>Board Consideration of Adoption</td>
<td>April 2019</td>
</tr>
</tbody>
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7. Contacts

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Documents & Additional Information Available at: