Toxicity Provisions

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

Presentation Overview

* Current Toxicity Framework
* Proposed Toxicity Framework
  * Goals
  * Interaction with the Basin Plans
  * Water Quality Objectives
  * Test Methods
  * Analysis of Test Results

Presentation Overview

* Proposed Toxicity Framework (Continued)
  * Non-Storm water NPDES Dischargers (includes Industry and POTWs)
    * Species Sensitivity Screening
    * Reasonable Potential Analysis
    * Routine Monitoring
    * Effluent Limits
    * Toxicity Reduction Evaluations
    * Exceptions
  * Storm water & Nonpoint Source Dischargers

Toxicity Control Requirements

* Chemical Specific Monitoring: Measure directly the amount of that substance (e.g., lead, copper, chlorine)
* **Aquatic Toxicity Monitoring:** Effect on aquatic organisms compared to control

What is Aquatic Toxicity Monitoring

* Expose organisms to test & control water
  - Invertebrate
  - Vertebrate
  - Plant
* Measure effects
  - Survival
  - Growth
  - Reproduction
* Look for a statistical significant difference

Current Aquatic Toxicity Protections

* Inconsistent Implementation of Toxicity testing in permits:
  * Reasonable Potential
  * Species Sensitivity Screening
  * Effluent Limitations
  * Monitoring Frequency
  * Statistical Approach

What is the Project?
Goals of New Toxicity Provisions

* Consistent protection of Waters of the State
* Statewide water quality objectives
* Consistent Toxicity Testing and Statistical Approach
* Consistent application in permits

Interaction with Basin Plans

* Supersedes
  * Methods for assessing compliance with water quality objectives (acute & chronic)
  * Toxicity testing & Interpretation of results
* Does not Supersede
  * Narrative objectives
  * Chemical specific limits, targets, or thresholds
  * Site specific Water Quality Objectives
  * Total Maximum Daily Loads (TMDLs)

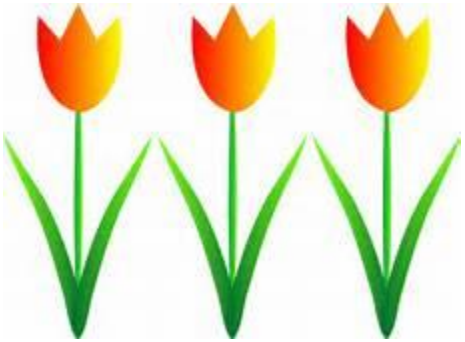
Null Hypothesis

A hypothesis which the investigator tries to disprove, reject or nullify or a hypothesis to be tested.

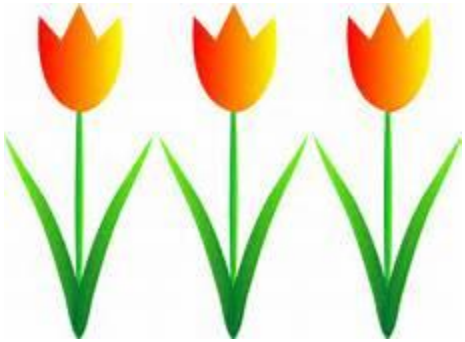
The Alternative Hypothesis is an alternative to the Null Hypothesis, and is generally the opposite statement.

* The power lies in the ability to reject the Null Hypothesis
  - Rejecting the Null Hypothesis confirms the Alternative Hypothesis

Example of Null Hypothesis



Group A



Group B

Toxicity Water Quality Objectives

Null Hypothesis

* chronic

H_o: Mean RESPONSE (ambient receiving water) ≤ 0.75 • mean RESPONSE (control)

* Acute

H_o: Mean RESPONSE (ambient receiving water) ≤ 0.80 • mean RESPONSE (control)

* Attainment = rejecting the null hypothesis

Toxicity Test Methods

* Species selected from Table 1 (in the Provisions)
* Methods established in the U.S. EPA Methods Manuals
* At the Instream Waste Concentration

Analysis of Test Results

* Statistical Approach
  * Test of Significant Toxicity (TST)
  * Results in either a “pass” or “fail”
* Percent Effect
* Must report both (pass/fail & percent effect)

Implementation For Non-Storm Water NPDES Dischargers

- Species Sensitivity Screening
- Reasonable Potential Analysis
- Routine Monitoring
- Effluent Limitations
- Toxicity Reduction Evaluation
- Exceptions

Species Sensitivity Screening

* Chronic
  * 4 sets of tests over 1 year
  * 3 species (plant, vertebrate, invertebrate)
* Acute
  * 4 sets of tests over 1 year
  * 2 species (vertebrate, invertebrate)
* Highest percent effect (typically)

Reasonable Potential Analysis

Applicability	Required	Not Required
Chronic Toxicity	POTWs < 5 MGD Other non-storm water NPDES Dischargers	POTWs ≥ 5 MGD
Acute Toxicity	Other non-storm water NPDES dischargers	* POTWs

* Permitting Authority has the discretion to require Reasonable Potential Analysis

Reasonable Potential Analysis (continued)

* All data over the past 5 years
  * As long as it is representative of effluent quality
* A minimum of 4 tests analyzed using the Test of Significant Toxicity (TST)
* Reasonable Potential if:
  * Any test results in a "Fail" **or**
  * 10% effect at the Instream Waste Concentration
  * Other information or data

Routine Monitoring Frequency

Chronic Toxicity	POTWs ≥ 5 MGD	Other NPDES dischargers ≥ 5 MGD with RP	POTWs < 5 MGD with RP	Other NPDES dischargers < 5 MGD with RP
Frequency	Monthly	Monthly	Quarterly	Quarterly

- Permitting Authority may increase or decrease frequency

Acute Toxicity	POTWs ≥ 5 MGD with RP	Other NPDES dischargers ≥ 5 MGD with RP	POTWs < 5 MGD with RP	Other NPDES dischargers < 5 MGD with RP
Frequency	Determined by Permitting Authority	Determined by Permitting Authority	Determined by Permitting Authority	Determined by Permitting Authority

Maximum Daily Effluent Limit

Chronic Toxicity

"No {most sensitive species} chronic toxicity test may result in a "fail" at the Instream Waste Concentration for the survival endpoint and a percent effect for the survival endpoint greater than or equal to 50 percent."

Survival Endpoint & *Ceriodaphnia*

Variations:

* The survival endpoint is not available for some test species (e.g. plants)
* The Test of Significant Toxicity (TST) cannot analyze for the survival endpoint for *Ceriodaphnia dubia*

Maximum Daily Effluent Limit

Chronic Toxicity Variation 1:

If the most sensitive species chronic toxicity test does not include the survival endpoint, then the permitting authority shall include the following Maximum Daily Effluent Limit:

"No {most sensitive species} chronic toxicity test may result in a "fail" at the Instream Waste Concentration for any endpoint measured in the test and a percent effect for that endpoint greater than or equal to 50 percent."

Maximum Daily Effluent Limit

Chronic Toxicity Variation 2:

If *Ceriodaphnia dubia* is the most sensitive species, then the permitting authority shall include the following Maximum Daily Effluent Limit:

"No *Ceriodaphnia dubia* chronic toxicity test may result in percent effect for the survival endpoint greater than or equal to 50 percent."

Maximum Daily Effluent Limit

Acute Toxicity

"No {most sensitive species} acute toxicity test may result in a "fail" at the Instream Waste Concentration for the survival endpoint and a percent effect for the survival endpoint greater than or equal to 50 percent."

Maximum Monthly Compliance Monitoring

MMEL Compliance			
Routine Monitoring	Compliance Test 1	Compliance Test 2	Violation
Pass	* NA	* NA	No
Fail	Pass	Pass	No
Fail	Pass	Fail	Yes
Fail	Fail	* NA	Yes

* Tests are not required

Median Monthly Effluent Limit

Chronic Toxicity

"No more than one {most sensitive species} chronic toxicity test initiated in a calendar month may result in a "fail" at the Instream Waste Concentration for any endpoint."

Two or more most sensitive species chronic toxicity tests initiated in a calendar month resulting in a "fail" at the Instream Waste Concentration for any endpoint is a violation of the Median Monthly Effluent Limit

Median Monthly Effluent Limit

Acute Toxicity

"No more than one {most sensitive species} acute toxicity test initiated in a calendar month may result in a "fail" at the Instream Waste Concentration for the survival endpoint"

Two or more most sensitive species acute toxicity tests initiated in a calendar month resulting in a "fail" at the Instream Waste Concentration for the survival endpoint is a violation of the Median Monthly Effluent Limit

Toxicity Reduction Evaluation (TRE)

A study conducted in a step-wise process designed to:

* Identify the causative agents of effluent or ambient toxicity,
* Isolate the sources of toxicity,
* Evaluate the effectiveness of toxicity control options,
* Confirm the reduction in toxicity.

Toxicity Reduction Evaluation (TRE)

* A Toxicity Reduction Evaluation is required when:
  * Two violations in the same month OR
  * Two violations in successive months
* Violations can be any combination
  * Maximum Daily
  * Median Monthly
  * Chronic
  * Acute

Exceptions

* Small disadvantaged communities
  * Specific to Publicly Owned Treatment Works (POTWs)
  * Finding of No Reasonable Potential
* Insignificant dischargers
  * Finding of No Reasonable Potential

Nonpoint Source & Storm Water

* If Toxicity monitoring requirements with species in Table 1
  * Issue order (within 1 year)
  * Use Test of Significant Toxicity (TST) for analysis (within 1 year of order)

Schedule

Updated: October 2017

Task Name	Target Date
Outreach	April 11, 12, 24th, 2017
Public Comment Period	~~Summer 2017~~ Winter 2017 - 2018
Workshop	~~Mid to late Summer~~ December 2017
Hearing	~~Fall 2017~~ January 2018
Board Consideration	~~By end of 2017~~ Summer 2018

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Questions/Comments