STAFF REPORT,
INCLUDING
SUBSTITUTE ENVIRONMENTAL DOCUMENTATION

FOR

STATE POLICY FOR WATER QUALITY CONTROL: TOXICITY PROVISIONS

Approved and Adopted by the State Water Resources Control Board on December 1, 2020
Revised by the State Water Resources Control Board on October 5, 2021

DIVISION OF WATER QUALITY

STATE WATER RESOURCES CONTROL BOARD

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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Editor's Note:

The *State Policy for Water Quality Control: Toxicity Provisions* was adopted by the State Water Resources Control Board on December 1, 2020, and was revised on October 5, 2021. In the October 5, 2021 Board Resolution revising the Toxicity Provisions, staff were directed to make minor, non-substantive edits to the formatting and organization of the document. This included updating section numbers throughout the document. The following table provides a list of the original and updated section numbers. When referring to a specific section of the *State Policy for Water Quality Control: Toxicity Provisions*, this Staff Report provides a reference to the finalized section number, followed by a parenthetical reference to the former section number.

Section Title	**Section Number in December 2020 Version**	**Section Number in Finalized Version**
INTRODUCTION	I	I (unchanged)
BENEFICIAL USES	II	None (deleted)
WATER QUALITY OBJECTIVES	III	II (now called AQUATIC TOXICITY WATER QUALITY OBJECTIVES)
[Reserved]	III.A.	None (deleted)
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Introduction

The State Water Resources Control Board (State Water Board) is proposing to adopt the State Policy for Water Quality Control: Toxicity Provisions (hereafter referred to as the Provisions).[1] The Provisions would establish the following elements: (1) numeric water quality objectives for both acute and chronic aquatic toxicity, (2) a program of implementation to control aquatic toxicity, (3) a consistent yet flexible framework for monitoring toxicity, and (4) a statewide statistical approach to analyze test results. The Provisions aim to provide consistent protection of aquatic life beneficial uses in waters throughout the state and protect aquatic habitats and biological life from the effects of known and unknown toxicants.

Aquatic toxicity occurs when the effects of pollutants in surface water negatively impact aquatic life beneficial uses. When originating from an effluent, these effects are typically referred to as "whole effluent toxicity" (WET). Toxicity tests estimate the effects of discharges to surface waters on the survival, growth, and reproduction of aquatic species in the receiving water. This is done through exposing test species to a laboratory test sample of either ambient water or effluent and comparing the effects to control water.

Currently, Section 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, which is also known as the Statewide Implementation Plan (SIP), includes minimum chronic toxicity control requirements for implementing the narrative toxicity objectives found in the Regional Water Quality Control Plans (basin plans) adopted by the nine Regional Water Quality Control Boards (Regional Water Boards). Each basin plan contains narrative toxicity objectives that require all waters to be maintained free of toxic substances in concentrations that produce detrimental responses in aquatic organisms, which are interpreted and implemented by the Regional Water Boards on a permit-by-permit basis. Such an approach has caused a lack of statewide consistency when addressing aquatic toxicity, and therefore new statewide aquatic toxicity water quality objectives are needed.

The purpose of the Staff Report is to present the basis for and rationale applied in the development and analysis of the Provisions and meet the State Water Boards requirement

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[1] NOTE: The portions of the Toxicity Provisions that apply to waters for which water quality standards are required by the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto (i.e., waters of the United States) will be incorporated into the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Future incorporation of those portions of the Toxicity Provisions, as adopted, into the water quality control plan will be considered non-substantive amendments. At that time, formatting and other organizational edits necessary for incorporation into the water quality control plan will be addressed.

to comply with the California Environmental Quality Act (CEQA).

Background

Beginning in 2003, the State Water Board acknowledged the need to revise the SIP to address inconsistencies in the application of effluent limitations for toxicity. In Order WQO 2003-0012, the State Water Board determined that (1) the propriety of including numeric effluent limitations for chronic toxicity in NPDES permits for publicly-owned treatment works (POTWs) should be considered in a regulatory setting, to allow for full public discussion and deliberation; and (2) the SIP be modified to specifically address the issue.

State Water Board Resolution No. 2003-0070 authorized State Water Board staff to make language corrections to the SIP and Resolution No. 2005-0019 directed State Water Board staff to introduce an amendment to the SIP to address narrative toxicity control provisions. Under State Water Board direction, the project was later changed from developing a policy as an amendment to the SIP, to developing a water quality control plan. In addition, the Provisions will provide consistent protection of aquatic life through the establishment of numeric water quality objectives for aquatic toxicity and a program of implementation.

Geographic Scope

The water quality objectives for aquatic toxicity would apply to all inland surface waters, enclosed bays, estuaries, and coastal lagoons in California with aquatic life beneficial uses. The Provisions would not apply to ocean waters and non-enclosed bays such as Monterey Bay and Santa Monica Bay.

Relationship to the Regional Water Quality Control Board Basin Plans

In accordance with Water Code section 13170, the Provisions automatically supersede a Regional Water Quality Control Board's water quality control plan (also known as a basin plan) for waters of the United States to the extent of any conflict. Consistent with its authority in Water Code sections 13140 and 13142, the State Water Resources Control Board has also determined that the Provisions will supersede any Basin Plans for all waters of the state to the extent of any conflict.

In particular, the Provisions would supersede portions of basin plans insofar as the basin plans 1) specify methods of assessing compliance with any numeric or narrative water quality objectives for acute and chronic toxicity; 2) regard aquatic toxicity testing or interpretation of aquatic toxicity testing results; 3) specify a numeric aquatic toxicity water quality objective that is not a site-specific water quality objective; or 4) are in conflict with the Provisions. The Provisions would also supersede Section 4 of the SIP and provide the Regional Water Quality Control Boards (Regional Water Boards) consistent requirements for monitoring and assessing compliance with aquatic toxicity water quality objectives.

The Provisions would not supersede existing narrative toxicity water quality objectives nor site-specific toxicity water quality objectives in basin plans. The Provisions also would not supersede any basin plan provisions regarding the application of narrative toxicity water quality objectives used to derive chemical-specific limits, targets, or thresholds. Additionally, the Provisions would not supersede any total maximum daily loads (TMDLs) related to aquatic toxicity (including their implementation provisions) that were established prior to the effective date of the Provisions.

Project Elements

Water Quality Objectives

The Provisions propose numeric water quality objectives for chronic and acute aquatic toxicity that are expressed as null hypotheses and incorporate a regulatory management decision (RMD). The RMDs represent the allowable error rates and thresholds that would result in an unacceptable risk to aquatic life. For chronic toxicity, the RMD is set at 25 percent and for acute toxicity, the RMD is set at 20 percent. Attainment of both the acute and chronic water quality objectives would be demonstrated by rejecting the null hypotheses and accepting the alternative hypotheses in accordance with the Test of Significant Toxicity (TST) statistical approach.

Test of Significant Toxicity Approach

Acute and chronic aquatic toxicity test data would be assessed using the Test of Significant Toxicity (TST) statistical approach as developed by United States Environmental Protection Agency (U.S. EPA 2010b). The TST approach is based on a type of modified hypothesis test referred to as bioequivalence testing. Bioequivalence is a statistical approach that has long been used in evaluating clinical trials in pharmaceutical products and by the Food and Drug Administration (FDA), in evaluating the attainment of soil cleanup standards for contaminated sites, and to evaluate the effects of pesticides in experimental ponds (U.S. EPA 2010a). The TST approach compares the organisms' response (e.g., survival, growth, and reproduction) in test water to the response of organisms held in control water. The TST approach improves upon the traditional hypothesis tests used to assess aquatic toxicity by establishing RMDs and through the reversal of the null and alternative hypothesis. The RMDs provide an unambiguous measurement of a test concentration's toxicity, while low false positive and false negative rates provide more statistical power to correctly identify a test concentration as "toxic" or "non-toxic." The restated acute and chronic null hypotheses provide dischargers with an incentive to improve the precision of test results (i.e., decrease within-test variability) by improving laboratory procedures and/or by increasing the number of replicates used in a given aquatic toxicity test.

Program of Implementation

The Porter-Cologne Water Quality Control Act (Wat. Code § 13000 et seq.) authorizes the Water Boards to establish a program of implementation to achieve water quality objectives. The program of implementation must include a description of actions necessary to achieve the water quality objectives, a time schedule for the actions to be taken, and a description of monitoring to be undertaken to determine compliance with the water quality objectives. (Water Code §13242).

The Provisions include a program of implementation that contains the following elements: (1) aquatic toxicity testing methods and analysis, (2) implementation for non-storm water National Pollution Discharge Elimination System (NPDES) dischargers, (3) implementation for storm water dischargers regulated pursuant to NPDES permits, (4) implementation for nonpoint dischargers required to monitor toxicity, and (5) variances and exceptions to the aquatic toxicity water quality objectives.

Toxicity Test Methods and Analysis

The Provisions would require the use of U.S. EPA standardized aquatic toxicity methods (U.S. EPA, 2002a, 2002b, 2002c, 1995). Specific aquatic toxicity test methods would ensure appropriate species selection and experimental design are paired with the prescribed statistical approach. This is an important consideration as experimental design paired with an incompatible statistical approach could lead to the incorrect characterization of aquatic toxicity.

Implementation for Non-Storm Water National Pollution Discharge Elimination System Dischargers

The Provisions contain specific implementation requirements for non-storm water NPDES dischargers, which include the following primary components:

- Instream Waste Concentration
- Species sensitivity screening
- Reasonable potential
- Aquatic toxicity monitoring
- Chronic aquatic toxicity effluent limitations
- Acute aquatic toxicity effluent limitations
- Targets for non-storm water NPDES dischargers without chronic aquatic toxicity effluent limitations
- Toxicity Reduction Evaluation (TRE)
- Flow-through acute toxicity testing systems
- Violation reporting and target reporting
- Exemptions

The Provisions would allow the State Water Board and Regional Water Boards to exempt biological pesticide and residual pesticide discharges, drinking water system discharges, natural gas facilities discharges, and certain non-storm water NPDES dischargers that are considered to be insignificant dischargers from some or all of the requirements of the Provisions.

Implementation for Storm Water and Nonpoint Source Dischargers

The Provisions do not require storm water and nonpoint source dischargers to conduct chronic or acute toxicity monitoring. However, storm water and nonpoint source dischargers that are required by the Water Boards to conduct toxicity testing and use the aquatic toxicity test methods and species specified in the Provisions are subject to the analysis and reporting requirements in the Provisions.

1 INTRODUCTION

Aquatic toxicity is the adverse response of aquatic organisms from exposure to chemical or physical agents, and/or their synergistic effects in effluent or receiving water. Acute aquatic toxicity refers to adverse response (typically lethality) from a short-term exposure. Chronic aquatic toxicity generally refers to longer exposure duration and measures of both lethal and sub-lethal adverse response, such as reduced growth or reduced reproduction. Aquatic toxicity may pose a serious threat to aquatic life.

Regional water quality control plans (also known as basin plans) contain narrative toxicity water quality objectives for the protection of aquatic life, which generally state that all waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life (i.e., no toxic pollutants in toxic amounts).

Statewide toxicity control requirements are found in the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, also known as the Statewide Implementation Policy (SIP) (State Water Board, 2005b). The SIP provides minimal requirements for implementation of basin plan narrative toxicity objectives in national pollutant discharge elimination system (NPDES) permits. As a result, effluent limitations have not been established consistently across the regions.

Numeric water quality objectives and a program of implementation are needed for California to be sufficiently protective of aquatic life in state waters, and thereby protective of beneficial uses. Such beneficial uses include, but are not limited to, warm freshwater habitat (WARM); cold freshwater habitat (COLD); wildlife habitat (WILD); estuarine habitat (EST); preservation of rare, threatened, or endangered species (RARE); migration of aquatic organisms (MIGR); spawning reproduction and/or early development (SPWN); marine habitat (MAR); inland saline water habitat (SAL); and wetland habitat (WET).

1.1 The Provisions

This Staff Report, Including Substitute Environmental Documentation (SED), for State Policy for Water Quality Control: Toxicity Provisions (referred to as the Staff Report) provides the supporting information used by the State Water Resources Control Board (State Water Board) for the adoption of the State Policy for Water Quality Control: Toxicity Provisions. The Toxicity Provisions are referred to as the Provisions throughout the Staff Report.

The geographic scope of the Provisions is all inland surface waters, enclosed bays, and estuaries and coastal lagoons in California. The Provisions would not apply to ocean waters and non-enclosed bays such as Monterey Bay and Santa Monica Bay.

The Provisions include statewide numeric water quality objectives for both chronic and acute aquatic toxicity, and a program of implementation which includes specific requirements for the analysis of aquatic toxicity test data. The water quality objectives would apply to all inland surface waters, enclosed bays, and estuaries. The Provisions also specify requirements for non-storm water NPDES dischargers including species sensitivity screening, reasonable potential analysis, monitoring requirements, mixing zones and dilution credits, effluent limitations, toxicity reduction evaluations (TREs), reporting requirements, and exemptions. One of the key features of the Provisions is the required use of the Test of Significant Toxicity (TST) approach for analyzing aquatic toxicity test data. The TST approach identifies significant toxic events with greater confidence than other statistical approaches and is already required by NPDES permits by the North Coast Regional Water Quality Control Board (North Coast Regional Water Board), Central Coast Regional Water Quality Control Board (Central Coast Regional Water Board), Los Angeles Regional Water Quality Control Board (Los Angeles Regional Water Board), Colorado River Regional Water Quality Control Board (Colorado River Regional Water Board), and the San Diego Regional Water Quality Control Board (San Diego Regional Water Board) along with the states of Hawaii (U.S. EPA Region 9, 2015) and Pennsylvania (U.S. EPA Region 3, 2014c).

Portions of the implementation requirements also apply to storm water dischargers and nonpoint source dischargers that are required to test for toxicity.

1.2 Purpose of the Staff Report

The State Water Board will use this Staff Report in determining whether to adopt the Provisions. The purpose of the Staff Report is to provide the supporting information used to develop the Provisions. This includes the need for the Provisions, technical information to support recommended approaches, as well as options for each approach, and alternatives considered in accordance with the California Water Code and California Environmental Quality Act (CEQA). The Staff Report also provides a record of the process used to develop the Provisions, including the environmental review, early consultation requirements, the public participation process, scientific peer review, and an economic analysis.

1.3 Regulatory Authority for the Provisions

The Federal Water Pollution Control Act (Clean Water Act) is the primary federal water pollution control statute. The Clean Water Act creates the basic structure under which point source discharges of pollutants are regulated and establishes the statutory basis for the NPDES permit program. The State Water Board is designated as the State Water Pollution Control Agency for all purposes under the Clean Water Act. The Porter-Cologne Water Quality Control Act (Wat. Code § 13000 et seq.) is the principal law governing water quality in California. The Porter-Cologne Water Quality Control Act establishes a comprehensive statutory program to protect the quality and “beneficial uses” (or “designated uses” under federal parlance) of waters of the state. A complete description of the regulatory authority for the Provisions can be found in Chapter 3 of this Staff Report.

1.4 History of Toxicity Planning Efforts

In 1991, the State Water Board adopted two statewide water quality control plans, the Inland Surface Waters Plan and the Enclosed Bays and Estuaries Plan. In 1994, litigation led to the rescission of both of these plans and California was left without water quality standards for many priority pollutants. To reestablish water quality criteria for these priority pollutants, and to effectively bring California into compliance with the federal regulations, the United States Environmental Protection Agency (U.S. EPA) promulgated the California Toxics Rule (CTR) in May 2000 (40 CFR § 131.38).

In March 2000, the State Water Board adopted the SIP. The SIP implements criteria for priority toxic pollutants contained in the CTR as well as other priority toxic pollutant criteria in the National Toxics Rule (NTR) and water quality objectives in the basin plans. The SIP applies to discharges of toxic pollutants into the inland surface waters, enclosed bays, and estuaries of California.

Section 303 of the Clean Water Act requires states to hold public hearings for review of water quality standards at least once every three years. In October 2002, the State Water Board solicited comments on potential revisions to the SIP. In December 2002, approximately 313 comments were received from 26 individuals and organizations. The State Water Board staff reviewed, carefully considered, and responded to all comments received.

In August 2003, State Water Board staff prepared a report with recommendations for revisions to the SIP to improve the SIP's clarity and functionality in a reasonable amount of time with existing resources. The State Water Board notified interested parties of its recommended SIP revisions and provided an additional 30-day comment period. The State Water Board held a public workshop on September 30, 2003, regarding issues to be addressed in future SIP amendments.

In 2002, Los Angeles Regional Water Board staff included numeric effluent limitations for toxicity in National Pollutant Discharge Elimination System (NPDES) permits for three publicly owned treatment works (POTW) in the Los Angeles County Sanitation District. The numeric effluent limitations were intended to implement the narrative chronic toxicity objectives established in the Los Angeles Regional Water Board basin plan. In response, the Los Angeles County Sanitation District filed petitions challenging these limitations and other permit requirements (Los Coyotes Water Reclamation Plant Order Nos. R4-2002-0121 and R4-2002-0122; Long Beach Water Reclamation Plant Order Nos. R4-2002-0123 and R4-2002-0124; and Whittier Narrows Water Reclamation Plant Order No. R4-2002-0142).

On September 16, 2003, during the comment period on the recommended revisions to the SIP, the State Water Board ruled on the petitions, resulting in Water Quality Order No. 2003-0012. In this Order, the State Water Board determined that (1) the propriety of including numeric effluents for chronic toxicity in NPDES permits for publicly-owned treatment works should be considered in a regulatory setting, in order to allow for full public discussion and deliberation; and (2) the SIP be modified to specifically address the issue.

Likewise in Water Quality Order No. 2003-013, the State Water Board referred to Water Quality Order No. 2003-0012 and concluded that the propriety of including numeric effluent limitations for chronic toxicity is best addressed through a rulemaking action in order to allow full public participation and deliberation.

Subsequently, on October 15, 2003, the State Water Board adopted Resolution No. 2003-0070 authorizing staff to prepare amendments to the SIP. Staff completed the draft amendments and provided an SED for public review on December 15, 2004. In January 2005, public comments were received from six organizations. The State Water Board held a public hearing on February 24, 2005, and addressed public comments. At this hearing, the State Water Board amended the SIP to provide a mechanism to implement the water quality criteria established in the CTR. The SIP establishes minimum requirements for implementing narrative toxicity objectives in the basin plans. However, these requirements are specific to narrative toxicity objectives and they do not address important implementation components such as effluent limitations, or how to establish reasonable potential. In Resolution No. 2005-0019, the State Water Board adopted the amendments to the SIP. These amendments included 1) allowing water effects ratios to be established in NPDES permits, 2) eliminating the reasonable potential trigger when ambient background pollutant concentrations exceed a priority pollutant objective, 3) adding mutual water companies to the exceptions in section 5.3, and 4) adding some non-regulatory language corrections for improved clarity.

As part of Resolution No. 2005-0019, the State Water Board also directed staff to introduce another amendment to the SIP to address narrative toxicity control provisions by January 2006. The draft Policy for Toxicity Assessment and Control (Toxicity Policy) proposed numeric toxicity objectives, a standardized method of data analysis, corresponding monitoring, reporting, and compliance determination requirements. If adopted, the draft Toxicity Policy would have superseded Section 4 of the SIP. The draft Toxicity Policy considered many of the same elements now included in the Provisions.

The State Water Board continued to indicate that the propriety of including numeric effluent limitations is best considered in a regulatory setting. For example, State Water Board WQO No. 2008-0008 referenced WQO No. 2003-0012 indicating that the propriety of including numeric effluent limitations is best considered in rulemaking. State Water Board WQO No. 2012-0001 indicated that numeric effluent limitations were not appropriate for the permit under review, but did not indicate or make a determination on whether NPDES permits more generally should include numeric toxicity effluent limitations; instead referencing WQO No. 2003-0012 indicating that the propriety of including numeric effluent limitations is best considered in rulemaking. In January 17, 2006, the first scoping meeting was held in Sacramento to provide the public an opportunity to comment on the draft Toxicity Policy. Staff also held a CEQA scoping meeting to seek input on the scope and content of the environmental information that should be considered in the planned amendment of the Toxicity Control Provisions in the SIP. Scoping was helpful in identifying the range of actions, alternatives, mitigation measures, and significant environmental effects to be analyzed prior to the decision-making process. Scoping was also found to be an effective way to bring together and resolve the concerns of affected federal, state, and local agencies, and other interested persons including those who might not be in accord with the action on environmental grounds. In November 2010, the State Water Board held a workshop and received public comments on the draft Toxicity Policy. In August 2011, the State Water Board held a workshop in which Dr. Jerry Diamond from Tetra Tech, provided a presentation on the *Effluent, Stormwater, and Ambient Toxicity Test Drive Analysis of the Test of Significant Toxicity (TST),* referred to as the TST Test Drive (U.S. EPA, 2011b).

On June 27, 2012, State Water Board staff circulated the draft Toxicity Policy for public review and comment. The comment period ran from June 27, 2012, until August 21, 2012. The State Water Board held a public hearing to receive oral comments on the draft Toxicity Policy on August 21, 2012. Additionally, accompanying draft environmental documents were provided to the public and prepared for the State Water Board pursuant to Section 21080.5 of the Public Resources Code.

Subsequent to the 2012 public hearing, staff were directed to incorporate the contents of the draft Toxicity Policy as an amendment to the Water Quality Control Plan for Enclosed Bays and Estuaries of California. The plan would directly supersede conflicting provisions in the basin plans and the Regional Boards would not have to amend their basin plans to incorporate the requirements.

Statewide Plans supersede regional water quality control plans, to the extent of any conflict between the two plans for the same waters (Wat. Code, § 13170.).

To achieve this combination, staff proposed the establishment of Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California (ISWEBE Plan), which can incorporate all statewide planning efforts for inland surface waters, enclosed bays, and estuaries in California into one statewide plan. The change from a “statewide policy” for aquatic toxicity to a statewide plan was made to facilitate implementation.

Additional stakeholder meetings were held were held in 2013 and 2017 with a variety of interested groups consisting of representative for POTWs, industry, regulatory agencies, storm water agencies, nonpoint sources, environmental groups, non-governmental agencies, and tribes. These public meetings are listed in Chapter 2.

On October 19, 2018, staff released the *Draft Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries; and Toxicity Provisions*, and the Draft Staff Report for public comment. The public comment period ran from October 19, 2018, to December 21, 2018. The State Water Board held a hearing on November 28, 2018. In addition to the oral comments received during the hearing, the Board received 37 comment letters on the October 19, 2018 Draft Toxicity Provisions and Staff Report. In their comment letters, commenters requested changes to several components of the draft Toxicity Provisions.

Staff met with stakeholders to review their comment letters and understand their concerns and, in response, prepared proposed changes to the Toxicity Provisions. Staff posted the First Revised Draft Toxicity Provisions and Staff Report on July 25, 2019. Staff held three staff workshops in August 2019 and the State Water Board held a workshop on October 3, 2019, to discuss the changes that were made and other proposed changes.

On December 24, 2019, staff posted two new appendices (Appendix J: Evaluating Laboratory Performance with the Chronic *Ceriodaphnia dubia* Reproduction Toxicity Test, and Appendix K: Survey of Laboratory Toxicity Testing Logistical Capacities) to the Staff Report for public comment, and held a workshop to discuss the appendices on January 9, 2020. Additionally, a First Revised Draft of Appendix J was released on January 10, 2020. The appendices address concerns raised by commenters in the 2018 comment letters. The public comment period closed on February 10, 2020. The Board received 9 comment letters on the new appendices.

Based on the input received during the workshops, staff made additional changes to the Toxicity Provisions and Staff Report. On July 7, 2020, staff posted the Second Revised Draft Toxicity Provisions and Staff Report for a limited scope 45-day public comment period. The Second Revised Draft Toxicity Provisions and Staff Report contains underline additions and strikeout deletions (shown with the “Track Changes” feature), which indicate revisions made to the 2018 Draft Toxicity Provisions and Staff Report. On July 22, 2020, staff posted the responses to the 2018 comments. Staff held a public workshop on July 29, 2020, to discuss the significant changes between the October 19, 2018 Draft Toxicity Provisions and Staff Report and the July 7, 2020 Draft Toxicity Provisions and Staff Report. The limited-scope public comment period ended on August 24, 2020, and the Board received 17 comment letters on the differences between the October 19, 2020 Draft Toxicity Provisions and Staff Report and July 7, 2020 Draft Toxicity Provisions and Staff Report. Staff reviewed the comment letters and prepared changes to the Toxicity Provisions.

On October 30, 2020, staff posted the Proposed Final Toxicity Provisions and Staff Report, with responses to the Appendices J and K comments and the differences between the October 19, 2018 Draft Toxicity Provisions and Staff Report and July 7, 2020 Draft Toxicity Provisions and Staff Report comments posted shortly thereafter.

On December 1, 2020, the State Water Board adopted Resolution No. 2020-0044 “Establishing the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California and Adopting Toxicity Provisions.” Resolution No. 2020-0044 established the ISWEBE Plan, adopted the Provisions, and approved and adopted the Substitute Environmental Documentation, which was prepared in accordance with the regulations applicable to the State Water Board’s certified regulatory programs, California Code of Regulations, title 23, sections 3777 through 3779.

On January 26, 2021, the Superior Court in *San Joaquin Tributaries Authority v. California State Water Resources Control Board* issued a judgment and writ “enjoining the State Water Board from applying, via the Water Quality Control Plan for Inland Surface Waters and Enclosed Bays [and Estuaries], the ‘State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State’ adopted by the State Water Board on April 2, 2019, to waters other than those for which water quality standards are required by the Federal Clean Water Act (33 U.S.C. Section 1251 et seq.).” The Superior

Court's decision upheld the adoption of the 'State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State' (the Procedures) as part of the (1) California Ocean Plan and (2) IISWEBE Plan for "waters of the United States" as defined by the Clean Water Act. The Superior Court rejected the other challenges to the Procedures that were raised by San Juaquin Tributaries Authority.

The Superior Court's decision addresses only the scope of the State Water Board's authority to adopt water quality control plans under Water Code section 13170. It does not restrict the State Water Board's authority to regulate the discharge of waste to all waters of the state pursuant to the Board's other regulatory tools, including its authority to adopt state policy for water quality control under Water Code section 13140. Accordingly, the Superior Court's decision did not impair the Water Boards' authority to regulate discharges of waste to all waters of the state, including waters of the state that are not also waters of the United States, except to the extent that such regulation is via the ISWEBE Plan.

As a result of the judgment and writ issued on January 26, 2021, described in Finding 3, State Water Board staff has ceased efforts to prepare and obtain approval of the ISWEBE Plan from the California Office of Administrative Law (OAL).

On October 5, 2021, the State Water Board will consider adopting a resolution rescinding the State Water Board's action to establish the ISWEBE Plan and confirming that because its December 1, 2020 action relied, in part, on Water Code section 13140, the Provisions were adopted as state policy for water quality control for all inland surface waters, enclosed bays, and estuaries and coastal lagoons of the state. Accordingly, the Toxicity Provisions would continue to apply to all inland surface waters, enclosed bays, estuaries, and coastal lagoons of the state as state policy for water quality control. The resolution also confirms that because the State Water Board's December 1, 2020 action relied, in part, on Water Code section 13170, the portions of the Toxicity Provisions that apply to waters for which water quality standards are required by the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto (i.e., waters of the United States) would continue to apply to waters of the United States and would be incorporated into the ISWEBE Plan coincident with, or subsequent to, the State Water Board's establishment of the ISWEBE Plan in the future. Consistent with the Superior Court's decision in *San Joaquin Tributaries Authority v. California State Water Resources Control Board*, the Toxicity Provisions would not apply to non-federal waters via the ISWEBE Plan.

It is appropriate for the Provisions, as state policy for water quality control, to supersede any conflicting provisions in regional water quality control plans because one of the primary objectives of the Provisions is to establish procedures for regulation of discharges creating toxicity effects to aquatic life in all inland surface waters, enclosed bays, estuaries, and coastal lagoons of the state, including those outside of federal jurisdiction. Superseding is also necessary to establish a uniform regulatory approach for all waters of the state and to strengthen regulatory effectiveness and improve consistency across all Water Boards. Because Water Code section 13146 requires state offices, departments, and boards, which includes Regional Water Boards, to comply with state policy for water quality control, superseding any conflicting provisions in regional water quality control plans will improve clarity regarding the Provision's applicability. Therefore, in accordance with Water Code section 13170, except where otherwise noted, the Provisions would automatically supersede any Basin Plan for waters of the United States to the extent of any conflict. Consistent with its authority in Water Code sections 13140 and 13142, the State Water Resources Control Board has also determined that the Provisions would supersede any Basin Plans for all waters of the state to the extent of any conflict.

Adoption of the Resolution would have no effect on any prior actions by the State Water Board other than as specifically described in the resolution, including, without limitation, the State Water Board's prior adoption of portions of the ISWEBE Plan using its water quality control plan authority or its state policy for water quality control authority.

1.5 Intended Use of the Staff Report by Agencies

The State CEQA Guidelines require that the project description include, among other things, a statement briefly describing the intended uses of the Environmental Impact Report (EIR) (Cal. Code Regs., tit. 14, § 15124, subd. (d)). The agencies expected to use this Staff Report in decision making are described below.

The State Water Board will use this Staff Report in determining whether to adopt the Provisions. The Water Boards may use the information contained within the Staff Report for future decision making or permitting. Furthermore, the Provisions include a program of implementation to achieve the applicable water quality objectives.

Therefore, if the project is approved, the State Water Board and Regional Water Boards (collectively, the Water Boards), permitted storm water dischargers, POTWs, and other dischargers, where they are considered public agencies for purpose of CEQA, may be considered responsible agencies and may use the Final Substitute Environmental Document (SED) adopted by the State Water Board in their decision-making actions to comply with the Provisions.

2 PROJECT DESCRIPTION

2.1 Introduction

The Water Boards' regulations for implementation of CEQA require the Staff Report to include a brief description of the Provisions (Cal. Code Regs., tit. 23, § 3777 subd. (b)(1)). This Chapter provides that description plus an overview of the goals of the Provisions; the precise location and boundaries of the project; the interactions that would occur between this project, the basin plans and the SIP; and a general description of the project's technical, economic, and environmental characteristics. The Staff Report also contains non-exclusive lists of: the agencies that are expected to use this Staff Report in their decision making and permits, other approvals required to implement the project, and related environmental review and consultation required by federal, state, or local laws, regulations, or policies as required by the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15124).

In-depth analyses of the project options and the justification for the preferred approach related to the Provisions are included in Chapter 5 of the Staff Report.

2.2 Project Goals

The main goal of the Provisions is to provide consistent protection of aquatic life in all inland surface waters, enclosed bays, and estuaries of the state from the effects of toxicity. To achieve consistent protection of aquatic life, the specific project goals are:

1. Adopt consistent, statewide water quality objectives for acute and chronic toxicity that are protective of California's waters from both known and unknown toxicants;
2. Adopt a program of implementation to control toxicity in discharges and achieve and maintain the toxicity water quality objectives in California waters;
3. Create a consistent, yet flexible framework for monitoring toxicity and laboratory analysis; and
4. Incorporate a statewide statistical approach to analyze test results that will provide a transparent determination of toxicity with high confidence in those results, and provide an incentive for dischargers to generate valid, high quality test data.

2.3 Project Title

This project is titled *State Policy for Water Quality Control: Toxicity Provisions* (the Toxicity Provisions are referred to throughout the Staff Report as the Provisions).

2.4 Project Location and Beneficial Uses

The Provisions would apply to inland surface waters, enclosed bays, and estuaries and coastal lagoons in California for the protection of aquatic life beneficial uses. These beneficial uses include but are not limited to: warm freshwater habitat (WARM), cold freshwater habitat (COLD), wildlife habitat (WILD), estuarine habitat (EST), preservation of rare, threatened, or endangered species (RARE), migration of aquatic organisms (MIGR), spawning reproduction and/or early development (SPWN), marine habitat (MAR), inland saline water habitat (SAL), and wetland habitat (WET). The Provisions would not apply to groundwater ocean waters, and open bays such as Monterey Bay and Santa Monica Bay.

2.5 Interactions with the Regional Water Board Basin Plans and the Statewide Implementation Policy

Each basin plan contains narrative water quality objectives for toxicity that require all waters to be maintained free of toxic substances in concentrations that produce detrimental responses in aquatic organisms. Most of the basin plans also state that all waters shall also be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in humans, plants, and terrestrial animals. Some basin plans also contain numeric triggers and implementation measures for toxicity. Toxicity control provisions are also found in Section 4 of the SIP, which was adopted by the State Water Board and approved by U.S. EPA.

The Provisions would supersede requirements for specific aquatic toxicity test methods, toxicity data analysis, and toxicity program implementation procedures established in the basin plans to the extent that there is a conflict for the same waters. The Provisions would also supersede a numeric aquatic toxicity water quality objective that is not a site-specific water quality objective. The Provisions would supersede Section 4 of the SIP and provide the Regional Water Boards consistent requirements to effectively evaluate whether discharges are in compliance with the water quality objectives for aquatic toxicity and implement measures to reduce toxicity.

The Provisions would not supersede existing narrative toxicity water quality objectives in the basin plans. The Provisions would not supersede any basin plan provisions regarding the application of narrative toxicity water quality objectives to derive chemical-specific limitations, targets, or thresholds.

The Water Boards may use narrative water quality objectives to derive a chemical-specific effluent limitation or chemical-specific receiving water limitation for specific pesticides, toxic metals, or other toxicants that may impact water quality.

The Water Boards may use a variety of methods, criteria, or guidelines developed by the State Water Board, the California Office of Environmental Health Hazard Assessment, the U.S. Food and Drug Administration, the National Academy of Sciences, the U.S. EPA, and other appropriate organizations to evaluate compliance with their narrative aquatic toxicity water quality objectives. Methods for determining compliance may include, but are not limited to, using indicator species, species diversity analysis, or population density analysis.

The Water Boards may rely solely on the numeric water quality objectives contained in the Provisions to address non-chemical specific aquatic toxicity, unless there is information available that suggests that the numeric water quality objectives in the Provisions are not protective of all aquatic species in a water body. For example, there may be non-Table 1 species that are more sensitive to certain types of pollutants which may be present in the water body than those species included in Table 1 of the Toxicity Provisions. For example, *Chironomus dilutus* (*C. dilutus*), which is not a Table 1 species, is more sensitive to neonicotinoid pesticides. The municipal regional storm water NPDES permit for the San Francisco Bay Region (Order No. R2-2015-0049) requires storm water dischargers to conduct toxicity tests using *C. dilutus* because it is more sensitive to this specific pollutant, which has been detected in their regional water bodies. In addition, there may be threatened or endangered species in a water body for which there is not a good surrogate species in Table 1, but there is a good non-Table 1 surrogate species that can be tested in the laboratory and will provide greater protection for that threatened or endangered species.

A Regional Water Board may apply the narrative toxicity water quality objectives in basin plans to derive either narrative or numeric receiving water limitations, narrative effluent limitations (e.g., best management practices), or to derive numeric effluent limitations. However, for non-stormwater NPDES dischargers, effluent limitations associated with non-Table 1 test methods cannot substitute for, or be used to determine compliance with, the numeric effluent limitations specified in the Provisions.

A Regional Water Board should include the numeric effluent limitations as specified in Sections III.C.5 and III.C.6 (formerly Sections IV.B.2.e and IV.B.2.f) of the Provisions using Table 1 species and may include an additional narrative or numeric effluent limitation using non-Table 1 species to be protective of more sensitive species in the water body. For example, if a non-storm water NPDES discharger is required to have the numeric effluent limitations as specified in the Provisions, and the Regional Water Board has a concern about a potential toxicant in the effluent for which there is a more sensitive non-Table 1 species, such as *C. dilutus*, or there is a threatened or endangered species in the receiving water or downstream for which there is a better non-Table 1 surrogate species, then the Regional Water Board may use the narrative water quality objective in their basin plan to derive either a narrative effluent limitation or numeric effluent limitation which will be assessed using a non-Table 1 species, in addition to the numeric effluent limitations assessed using Table 1 species as required by the Provisions. The additional narrative or numeric effluent limitation which will be assessed using a non-Table 1 species must be assessed using a statistical approach other than the TST statistical approach. If the Regional Water Board includes in an NPDES permit the applicable numeric effluent limitation(s) specified in the Provisions, the permit should not include any other numeric effluent limitations using Table 1 species except when it is a more stringent TMDL based effluent limitation. The rationale for requiring additional effluent limitations shall be documented in the NPDES fact sheet (or equivalent document) or Water Code section

13383 Order.

If a Regional Water Board includes a numeric aquatic toxicity effluent limitation or numeric aquatic toxicity receiving water limitation using any of the chronic or acute test methods identified in Table 1 of the Provisions, the limitation must be derived from the applicable numeric water quality objective in Section II.C (formerly Section III.B) of the Provisions, except as provided in Section II.D (formerly Section III.B.3) for more protective TMDL-based requirements.

Federal regulations require numeric effluent limitations in some circumstances. Nothing in the Provisions overrides this requirement. Nothing in the Provisions changes federal law or otherwise indicates that the Water Boards do not need to comply with federal law. The permitting authority, often the Regional Water Board, would need to ensure an issued, reissued, renewed, or reopened NPDES permit is consistent with federal law and would need to follow appropriate notice and public comment processes.

The Provisions would not supersede any site-specific water quality objectives for toxicity established in the basin plans. In addition, any total maximum daily load (TMDL) and the associated implementation requirements established by a Regional Water Board prior to the effective date of the Provisions would not be superseded and would not require reconsideration for the purposes of compliance with these Provisions. The program of implementation in the Provisions apply to dischargers subject to TMDL requirements except to the extent the Regional Water Board determines that any specific provisions of the aquatic toxicity TMDL are more protective than any comparable requirements of the Provisions, in which case those specific provisions of the TMDL will apply in lieu of the comparable requirements of the Provisions. For example, if the effluent limitations in the Provisions are more protective and the monitoring frequency in the TMDL is more protective, then NPDES permits should include the effluent limitations from the Provisions and the monitoring frequency from the TMDL. Some TMDLs include targets or waste load allocations which are based on a statistical approach other than the TST. For these TMDLs, the Regional Water Board could include effluent limitations or receiving water limitations using Table 1 species and a statistical approach other than the TST only if the Regional Water Board makes a finding that the TMDL based requirement is more protective than the comparable requirement in the Provisions.

Appendix D includes the toxicity water quality objectives from each of the Regional Water Board basin plans. Appendix E includes the objectives with strike-out and underline formatting to indicate the language that would be superseded by the Provisions.

2.6 Description of the Provisions

Pursuant with project goal one listed in 2.2, the Provisions would provide consistent statewide numeric water quality objectives. The proposed numeric water quality objectives are expressed in terms of a null and an alternative hypothesis which incorporate a regulatory management decision (RMD). The chronic and acute RMDs are set at levels that are determined to be biologically significant. Although the levels selected for the RMDs are informed by scientific considerations and are consistent with effect levels often used in other approaches, selecting the RMDs was a policy decision. Attainment of the water quality objective is demonstrated when the null hypothesis is rejected and the alternative hypothesis is accepted. To reject the null hypothesis, aquatic toxicity tests are conducted, and the organisms' response to the test water (e.g., ambient water) is compared to a control and analyzed using the TST statistical approach.

Pursuant with project goals two and three, the program of implementation in the Provisions provides a framework for application of implementation requirements. Most of the implementation requirements in the Provisions apply to non-storm water NPDES dischargers, which include, but are not limited to POTWs, petroleum refineries, power plants, tank farms, aquaculture, manufacturing, boatyards and shipyards, sand and gravel mining, metal mining, educational facilities, food processors, saw mills, concrete manufacturers, landfills, and paper mills. For non-storm water NPDES dischargers, the program of implementation includes requirements such as reasonable potential analysis, the use of the TST approach for data analysis, setting effluent limitations, and routine monitoring that are consistently and fairly applied statewide. Some implementation requirements also apply to storm water and nonpoint source dischargers that are required to conduct acute or chronic aquatic toxicity tests. For storm water and nonpoint source dischargers, the program of implementation includes data analysis using the TST approach and reporting requirements.

Pursuant with project goal four, the Provisions would require the use of the TST approach as a single, consistent statewide statistical approach for analyzing data from aquatic toxicity tests. In addition to establishing consistency statewide, the TST approach is simpler to incorporate into permits than other available statistical approaches used in the past. Use of a single statistical approach statewide also ensures that data generated from all programs could be considered and evaluated together for the Integrated Report and other water quality assessments.

The TST approach does not change the U.S. EPA aquatic toxicity test methods, rather it is an approach used to analyze the data generated by aquatic toxicity test methods. The TST approach was developed by the U.S. EPA and utilizes hypothesis testing techniques based on many peer-reviewed publications to generate clear "Pass/Fail" results. The TST is a directional hypothesis test that tests the hypothesis "does the test organisms response in the effluent concentration of concern (e.g., IWC) and the control differ by a biologically significant amount?" To get a "pass" result in the TST, the response of the organisms in the sample does not need to be equal to the response of organisms in the control to be considered non-toxic.

Use of the TST approach provides greater confidence in the results as it allows regulators to minimize both the occurrence of false negatives (i.e., declaring an effluent safe when it is actually toxic), and the occurrence of false positives (i.e., declaring an effluent toxic when it is actually not toxic). The TST approach incorporates these test error values as regulatory management decisions (RMDs) which specify what effect level in the effluent is considered unacceptably toxic and the desired frequency of declaring a truly negligible effect within a test non-toxic. The current hypothesis testing approaches do not address false negatives, just as the current approaches do not define what levels of toxicity are considered unacceptable. The RMDs used in the Provisions were developed to account for normal test variability. U.S. EPA and the State Water Board demonstrated that the RMDs are scientifically valid through peer review and the TST Test Drive. The TST approach, with a rephrased null hypothesis that incorporates RMDs provides a positive incentive for the permittee to generate high quality data with low test variability increasing the confidence that correct determinations are made. A more detailed discussion of the TST is provided in Section 2.6.6, Section 5.3.1, and Appendix J of the Staff Report.

2.6.1 Water Quality Objectives

The numeric toxicity water quality objectives are expressed in the form of a null hypothesis and alternative hypothesis. Attainment of the water quality objective is demonstrated by conducting aquatic toxicity testing, analyzing the data using the TST statistical approach, and rejecting the null hypothesis. When the null hypothesis is rejected, the alternative hypothesis is accepted in its place, and there is no exceedance of the water quality objective. An exceedance of the water quality objective is demonstrated by failing to reject the null hypothesis.

In the Provisions, for the chronic toxicity water quality objective, the null hypothesis is the following general statement: the ambient water is toxic because the response (e.g., survival, reproduction, growth) of the test organisms in the ambient water sample is less than or equal to 75 percent of the test organisms’ response in the control water sample. For the chronic water quality objective, the alternative hypothesis is the following general statement: the ambient water is not toxic because the response (e.g., survival, reproduction, growth) of the test organisms in the ambient water sample is greater than 75 percent of the test organisms’ response in the control water sample.

For the acute toxicity water quality objective, the null hypothesis is the following general statement: the ambient water is toxic because the response(e.g., survival) of the test organisms in the ambient water sample is less than or equal to 80 percent of the test organisms’ response in the control water sample. For the acute toxicity water quality objective, the alternative hypothesis is the following general statement: the ambient water is not toxic because the response (e.g., survival) of the test organisms in the ambient water sample is greater than 80 percent of the test organisms’ response in the control water sample.

Regulatory Management Decisions

The regulatory management decision (RMD) is the decision that represents the maximum allowable error rates and thresholds for chronic and acute toxicity (and non-toxicity) that would result in an unacceptable risk to aquatic life. The RMDs would be set for both the chronic and acute objectives at 25 and 20 percent. The RMDs incorporated into the TST approach were selected based on considerable research and analysis involving several of the U.S. EPA WET testing methods. It is also consistent with the thresholds used in earlier statistical approaches (e.g., EC_{25}, IC_{25}, LC_{25}).

2.6.2 Aquatic Toxicity Test Methods

Aquatic toxicity tests measure the effects of effluent or ambient water on specific test organisms. Aquatic toxicity test methods establish procedures for conducting chronic (e.g., growth, reproduction and survival) and acute (e.g., survival) toxicity tests. The primary difference between chronic and acute tests is the inclusion of a sublethal endpoint for chronic tests and evaluation of survival only for acute tests. The Provisions specify the aquatic toxicity test methods to be used for chronic and acute aquatic toxicity tests in either fresh, estuarine or marine waters, to assess whether ambient water meets the numeric water quality objectives and whether discharger effluent complies with applicable permit terms. Both chronic and acute aquatic toxicity tests are those indicated in the U.S. EPA method manuals (U.S. EPA 2002a, 2002b, 2002c, and 1995). The aquatic toxicity test method manuals specify testing parameters such as test temperature, organism age, feeding regime, test duration, test design, and test species to be used for conducting the test procedures. The Provisions do not modify the U.S. EPA methods.

A biological endpoint is an effect that is measured in a toxicity study or field survey. Biological endpoints in aquatic toxicity tests may include, but are not limited to, test species survival, reproduction, and growth. Specific species have different biological endpoints depending on the aquatic toxicity test method used.

The chronic and acute aquatic toxicity tests would be conducted using one or more species from U.S. EPA method manuals. Table 1 of the Provisions lists the test species required to be used to determine compliance with the water quality objectives for both chronic and acute toxicity.

2.6.3 Test of Significant Toxicity Approach

The TST is a statistical approach that would be used to determine if there is a statistically significant adverse effect on specific biological endpoints by analyzing data derived from aquatic toxicity tests. The TST statistical approach analyzes the data and provides results in the form of a “fail” or “pass”. Software which can be used to perform the TST analysis is readily available to laboratories throughout the state for applying the TST approach. A TST calculator, which can be used by dischargers and laboratories to assess toxicity test results is available on the Water Board’s toxicity page at: https://www.waterboards.ca.gov/water_issues/programs/state_implementation_policy/tx_ass_cntrl.html

2.6.4 Percent Effect

The Provisions would require non-storm water NPDES dischargers to calculate and report the percent effect for each biological endpoint for all aquatic toxicity tests. Storm water and nonpoint source dischargers would also need to calculate and report the percent effect only when species listed in Table 1 are used. The percent effect would be calculated using the untransformed data and the following equation[2]:

$$\text{Percent Effect at the IWC} = \frac{\text{Mean Control Response} - \text{Mean IWC Response}}{\text{Mean Control Response}} \bullet 100$$

2.6.5 The TST Approach and the Distinction Between Statistical Approaches and Aquatic Toxicity Test Methods

The TST approach should not be confused with an aquatic toxicity test method.[3] The TST approach is used in the analysis of toxicity data generated from the test methods. In contrast, aquatic toxicity test methods are laboratory procedures that measure biological effects on aquatic organisms exposed to environmental samples. Aquatic toxicity test methods identify what test species and life stage to test, what food to feed the test species, and what biological endpoint (survival, growth, etc.) to measure. In contrast to test methods which identify how data is generated, a statistical approach identifies how to analyze toxicity data.

U.S. EPA promulgates guidelines establishing test methods for data gathering and compliance monitoring. The promulgated test methods can be found in the Code of Federal Regulations (CFR), title 40, part 136. U.S. EPA's regulations at 40 CFR §§ 136.4 and 136.5 establish procedures for the approval of an alternative test procedure (ATP). Additionally, permit writers may include requirements for the use of aquatic toxicity test methods that are not identified in part 136 on a permit by permit basis. The Provisions require the use of U.S. EPA toxicity test methods.

At the time of writing this Staff Report, U.S. EPA aquatic toxicity test methods indicate the use of multi-concentrations. The Provisions do not change or require different procedures than the test methods. The U.S. EPA toxicity test methods identify common patterns to toxicity test data and provide guidance on using concentration-response relationships to review toxicity test results. However, U.S. EPA neither recommends nor requires review of the concentration-response pattern for a multi-concentration test prior to or subsequent to running the TST approach. The TST approach analyzes data from a single concentration compared to a control. Interpreting resulting data using the TST approach does not result in changes to the WET test methods identified in 40 CFR part 136.3 or U.S. EPA method manuals. It does not alter specified procedures in the test methods (e.g., organism age,

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[2] IWC in the equation is the Instream Waste Concentration. A definition can be found in the glossary of this Staff Report and the Provisions.
[3] "Toxicity test methods" are also sometimes referred to as "toxicity test procedures," "biological test procedures," "biological laboratory procedures," or "analytical methods." For purposes of this Staff Report, the term "toxicity test methods" will be used.

food, temperature, exposure length), nor does it alter the number of concentrations required to be used in producing data. The TST approach can be conducted regardless of the concentration-response pattern.

The state has the discretion to select the statistical approach for analyzing test data that is most appropriate for use in a particular plan, permit, or monitoring program. The U.S. EPA method manuals indicate that: “[T]he statistical methods recommended in the manual are not the only possible methods of statistical analysis.”[4] The TST approach is a statistical option that U.S. EPA has added to the current recommended statistical approaches. Use of the TST approach does not alter promulgated requirements of the test method, such as specified biological and laboratory procedures.

U.S. EPA’s National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document provides a technical basis for the TST approach (U.S. EPA 2010c). Just like U.S. EPA’s published materials on the point-estimate technique and NOEC statistical approach provide guidance, this document describes a statistical option for states and permitting authorities. The state is not bound by that publication to use the TST approach. However, the state has discretion to select the statistical approach that is most appropriate for compliance and reporting purposes. The adoption of the TST approach is being carried out pursuant to a public process that comports with the requirements of U.S. EPA and the California Office of Administrative Law (see Gov. Code § 11353). The TST approach for use in the statistical analysis of toxicity test data has undergone an extensive external peer review process by both the U.S. EPA and the State Water Board. The State Water Board's adoption of the Provisions would not constitute an underground regulation (see Cal. Code Regs., tit. 1, § 250, subd. (a)).

At the time of writing this Staff Report, U.S. EPA aquatic toxicity test methods require the use of five concentrations of the effluent. On February 12, 2014, California submitted an application for U.S. EPA Region IX review and approval of statewide Alternate Test Procedure for use of a two-concentration test design when using the Test of Significant Toxicity (TST) hypothesis testing approach.

This ATP request was for U.S.EPA to approve the use of one effluent concentration in aquatic toxicity test methods when using the TST statistical approach. On March 17, 2014, U.S. EPA Region IX Quality Assurance Office approved the State of California’s request to use a limited-use (statewide) ATP (use of one concentration in lieu of the 5 concentrations). On February 11, 2015, the U.S. EPA withdrew the approval of State Water

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[4] See U.S. EPA, Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (Oct. 2002), EPA-821-R-02-013, section 9.4.1.2; U.S. EPA, Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, (Oct. 2002), EPA-821-R-02-014, section 9.4.1.2; U.S. EPA, Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, First Edition (August 1995) EPA-600-R-95-136, section 9.4.1.2; U.S. EPA, Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Oct. 2002), EPA-821-R-02-012, section 11.1.4.

Board's ATP. As of the date of this writing, the state has not yet submitted a new application for a limited-use ATP for one effluent concentration for permits in California requiring the TST statistical approach for permit compliance. While a new ATP application is not needed prior to approval or implementation of the Provisions, the State Water Board is currently drafting an application for an ATP for the use of the one effluent concentration when the TST is the required statistical approach in the permit. This ATP, if approved, would provide an option for laboratory cost savings.

2.6.6 Program of Implementation

A detailed summary of the program of implementation requirements for each of the following discharge types is provided below:

I. Non-storm water NPDES dischargers
II. Storm water dischargers
III. Nonpoint source dischargers

I. Non-Storm Water NPDES Dischargers

The Provisions require the Water Boards to include in NPDES permits, except where the Provisions specify that the Water Boards have discretion, the following requirements for non-storm water NPDES dischargers.

A. Species Sensitivity Screening

Non-storm water NPDES dischargers will be required to conduct a species sensitivity screening for chronic toxicity to determine the most sensitive species to use in chronic aquatic toxicity monitoring. The Water Boards will also have the discretion to require non-storm water NPDES dischargers to conduct a species sensitivity screening for acute toxicity. The Water Boards will require species sensitivity screening for chronic toxicity, as part of a report of waste discharge, or as a permit condition, or both. If the Water Boards require species sensitivity screening for acute toxicity it will be required as part of a report of waste discharge, a Water Code section 13383 order, or as a permit condition.

For continuous dischargers, four sets of tests for chronic or acute toxicity must be conducted within one year. For non-continuous dischargers, also known as seasonal or intermittent dischargers, between two and four sets of tests for chronic or acute toxicity must be conducted within one year.

For chronic toxicity, each set of tests must consist of at least one vertebrate, one invertebrate, and one aquatic plant/algae. For acute toxicity, each set of tests must consist of at least one vertebrate and one invertebrate.

For both chronic and acute toxicity, continuous dischargers are to conduct the four sets of testing of the species sensitivity screening, one set of tests per quarter, over four consecutive quarters.

For both chronic and acute toxicity, non-continuous dischargers are to conduct a set of species sensitivity screening tests in quarters during which there is expected to be at least 15 days of discharge to surface water, with a minimum requirement of two sets of tests.

For dischargers that are not expected to have at least 15 days of discharge in any quarter, the Water Boards will determine if a species sensitivity screening for chronic toxicity is required, and the number of sets of tests in the screening. If a species sensitivity screening is not required, the Water Boards would specify the most sensitive species.

For non-continuous dischargers, tests in a specific species sensitivity screening can be conducted using effluent that is not discharged into surface waters as long as the effluent is representative of the effluent that will be discharged to surface waters. One example of effluent not discharged into surface water is effluent discharged onto land because of a prohibition on discharge into surface water during the summer season. When there is no effluent available to complete tests in one of the sets in a species sensitivity screening, that set of testing shall not be required.

The Water Boards have discretion to choose how the most sensitive species is selected from the species sensitivity screening. However, the Water Boards should select the species exhibiting the highest percent effect at the instream waste concentration (IWC) as the most sensitive species. The IWC is the concentration of effluent in the receiving water after mixing. The Water Boards must specify how the most sensitive species is selected and document that selection.

Non-storm water NPDES dischargers will be required to conduct a species sensitivity screening for chronic toxicity either prior to, or within 18 months after the first issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the permit after the effective date of the Toxicity Provisions. The Water Boards may allow use of test data generated within ten years prior to the first issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the permit after the effective date of the Provisions. Data generated prior to the effective date of the Provisions can only be used if the screening is representative of the effluent, and either:

(1) was conducted in accordance with the requirements of Section III.C.2.c (formerly Section IV.B.2.b.iii) of the Provisions, or

(2) the Regional Water Board accepts the use of the data in the screening, the data were analyzed using the TST, and the screening was conducted using at least one vertebrate, one invertebrate and one aquatic plant/algae from Table 1 of the Provisions.

A species sensitivity screening must be conducted prior to any subsequent issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the permit if (1) the discharger has not conducted a species sensitivity screening in accordance with the Provisions within the previous 15 years or (2) if the effluent used in the last species sensitivity screening is no longer representative of the effluent. The Water Boards may require a species sensitivity screening for chronic toxicity prior to every subsequent issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the permit.

B. Reasonable Potential Analysis

Dischargers which have reasonable potential to cause or contribute to an exceedance of the chronic or acute toxicity objectives are required to conduct routine monitoring and are subject to effluent limitations. For both chronic and acute toxicity, reasonable potential exists if any of the toxicity tests results in a “fail” or if the percent effect at the IWC is greater than 10 percent.

Furthermore, the Water Boards may use other information or data to determine if there is reasonable potential, including, but not limited to, fish die off observations, data using a different concentration than the IWC, lack of available dilution, water quality and beneficial uses of the receiving water, the presence of endangered or threatened species or critical habitat, or existing data on toxic pollutants.

All toxicity test data generated within five years prior to permit issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) representative of effluent quality during discharge conditions shall be evaluated in determining reasonable potential. Data generated within those five years from a minimum of four tests using species specified by the Water Boards and selected from Table 1 of Section III.B.2 (formerly Section IV.B.1.b) of the Provisions must be conducted at the IWC and be analyzed using the TST approach. If the minimum data are not available, the Water Boards can either require the discharger to conduct a minimum of four tests at the IWC, using a species selected by the Water Boards, or use aquatic toxicity tests conducted at the next highest concentration of effluent for the purposes of determining reasonable potential.

If a reasonable potential analysis indicates there is reasonable potential, then the Water Boards must include the corresponding maximum daily effluent limitation (MDEL) and median monthly effluent limitation (MMEL) in the NPDES permit.

POTW dischargers authorized to discharge at a rate equal to or greater than 5 MGD

POTW dischargers authorized to discharge at a rate equal to or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) would not be required to conduct a reasonable potential analysis for chronic toxicity. These POTW dischargers would be required to perform routine monitoring and would be required to comply with the chronic toxicity effluent limitations.

POTW dischargers authorized to discharge at a rate equal to or greater than 5 MGD and are not required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) would be required to conduct a reasonable potential analysis for chronic toxicity prior to every permit issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements).

The Water Boards would have the discretion whether to require a reasonable potential analysis for acute toxicity for POTW dischargers authorized to discharge at a rate equal to or greater than 5 MGD. The decision would be documented in the NPDES fact sheet (or equivalent document).

POTW dischargers authorized to discharge at a rate less than 5 MGD

POTW dischargers authorized to discharge at a rate less than 5 MGD would have to conduct a reasonable potential analysis for chronic toxicity prior to every permit issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements).

The Water Boards would have the discretion whether to require a reasonable potential analysis for acute toxicity for POTW dischargers authorized to discharge at a rate less than 5 MGD. The decision would be documented in the NPDES fact sheet (or equivalent document).

Other non-storm water NPDES dischargers

Except for POTW dischargers authorized to discharge at a rate equal to or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020), all other non-storm water NPDES dischargers would be required to conduct a reasonable potential analysis for chronic toxicity prior to every permit issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements). The Water Boards would have the discretion whether to require a reasonable potential analysis for acute toxicity for all non-storm water NPDES dischargers, including POTW dischargers, prior to every permit issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements). The decision would be documented in the NPDES fact sheet or equivalent document.

C. Routine Monitoring Frequency for Chronic Toxicity

The Water Boards shall include toxicity monitoring requirements in an NPDES permit or Water Code Section 13383 Order for all non-storm water NPDES dischargers. The required toxicity monitoring includes routine monitoring, and when applicable, either target tests or compliance tests.

Routine Monitoring

Routine monitoring is required monitoring that occurs during a permit term. Routine monitoring refers to the required toxicity testing described in Section III.C.4 (formerly Section IV.B.2.d) of the Provisions. For non-storm water NPDES dischargers with acute and/or chronic toxicity effluent limitations, routine monitoring is used to determine compliance with the MDEL, and is used with MMEL compliance tests to determine compliance with the MMEL. For non-storm water NPDES dischargers that do not have chronic toxicity effluent limitations, routine monitoring is used to determine attainment of the maximum daily effluent target (MDET), and is used with median monthly effluent target (MMET) compliance tests to determine if the MMET is being met. See Table 2-1 for a summary of the chronic toxicity routine monitoring frequencies for different types of dischargers.

POTW Dischargers Authorized to Discharge at a Rate Equal to or Greater than 5 MGD

All POTW dischargers that are authorized to discharge at a rate equal to or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) must conduct monthly routine monitoring for chronic toxicity in each calendar month during which there is expected to be at least 15 days of discharge.

All POTW dischargers that are authorized to discharge at a rate equal to or greater than 5 MGD, that are not required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020), and that have effluent limitations for chronic toxicity must conduct monthly routine monitoring for chronic toxicity in each calendar month during which there is expected to be at least 15 days of discharge.

POTW Dischargers Authorized to Discharge at a Rate Less than 5 MGD but Greater than 1 MGD

All POTW dischargers with reasonable potential for chronic toxicity that are authorized to discharge at a rate less than 5 MGD but greater than 1 MGD are required to conduct quarterly routine monitoring in each quarter during which there is expected to be least 15 days of discharge.

POTW Dischargers Authorized to Discharge at a Rate Equal to or Less than 1 MGD

All POTW dischargers with effluent limitations for chronic toxicity that are authorized to discharge at a rate equal to or less than 1 MGD are required to conduct at least two routine monitoring tests in any calendar year during which there is expected to be at least 15 days of discharge in at least one calendar quarter.

Other Non-Storm Water NPDES Dischargers Authorized to Discharge at a Rate Equal to or Greater than 5 MGD

All other non-storm water NPDES dischargers with reasonable potential for chronic toxicity that are authorized to discharge at a rate equal to or greater than 5 MGD are required to conduct monthly routine monitoring for chronic toxicity in each calendar month during which there is expected to be least 15 days of discharge.

Other Non-Storm Water NPDES Dischargers Authorized to Discharge at a Rate Less than 5 MGD

All other non-storm water NPDES dischargers with reasonable potential for chronic toxicity that are authorized to discharge at a rate of less than 5 MGD are required to conduct quarterly routine monitoring in each quarter during which there is expected to be least 15 days of discharge.

Non-Storm Water NPDES Dischargers that do not have Chronic Toxicity Effluent Limitations

All non-storm water NPDES dischargers that are not required to comply with chronic aquatic toxicity effluent limitations are required to conduct two aquatic toxicity routine monitoring tests in any calendar year during which there is expected to be least 15 days of discharge in at least one quarter. However, the Water Boards may exempt certain non-storm water NPDES dischargers from these monitoring requirements if the discharger qualifies for one of the exemptions specified in Section III.C.11 (formerly Section IV.B.2.k) of the Provisions.

Conditions for Increasing or Decreasing the Routine Monitoring Frequency for Chronic Toxicity

The Water Boards have the option to increase or decrease the routine monitoring frequencies under certain conditions as described in the Provisions. Conditions for increasing or decreasing the routing monitoring frequency are discussed in Section 5.4.4 of the Staff Report. The chronic routine monitoring frequency cannot be less than twice per calendar year.

Table 2-1. Chronic Toxicity Routine Monitoring Frequencies

Discharger Type	Chronic Monitoring Frequency
POTWs ≥ 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a)	Monthly
POTWs ≥ 5 MGD, that are not required to have a pretreatment program by the terms of 40 CFR § 403.8(a), and have effluent limitations	Monthly
POTWs < 5 MGD and that are > 1 MGD, and have effluent limitations	Quarterly
POTWs ≤ 1 MGD and have effluent limitations	Biannually

Discharger Type	Chronic Monitoring Frequency
Other non-storm water NPDES dischargers ≥ 5 MGD and have effluent limitations	Monthly
Other non-storm water NPDES dischargers < 5 MGD and have effluent limitations	Quarterly
All non-storm water NPDES dischargers without effluent limitations	Biannually

D. Routine Monitoring Frequency for Acute Toxicity

All non-storm water NPDES dischargers, including POTW dischargers, with reasonable potential for acute toxicity will be required to conduct routine monitoring in addition to any other required chronic toxicity routine monitoring. The Water Boards would set the routine monitoring frequency, although the frequency cannot be less once per year.

MMEL Compliance Tests

For dischargers with effluent limitations, when a routine monitoring test results in a “fail,” the discharger must initiate up to two MMEL compliance tests within the same calendar month in which the “fail” occurred. For the purpose of chronic and acute toxicity, MMEL compliance tests are a maximum of two tests that are used in addition to the routine monitoring test to determine a violation of the MMEL. See Table 2-2 below.

MMET Tests

For dischargers without effluent limitations, when a chronic toxicity routine monitoring test results in a “fail,” the discharger must initiate up to two MMET tests within the same calendar month in which the “fail” occurred. For the purpose of chronic and acute toxicity, MMET tests are a maximum of two tests that are used in addition to the routine monitoring test to determine if the MMET is being met.

Additional Routine Monitoring Test for TRE Determination

For dischargers with effluent limitations, whenever there is one violation of the MDEL or MMEL in a singular calendar month, but not two, dischargers with a less than monthly monitoring frequency are required to initiate an additional routine monitoring test. The additional routine monitoring test must be initiated within two weeks after the calendar month in which the violation occurred. The additional routine monitoring test will be used to determine if a TRE is necessary and will also be used for compliance purposes.

For dischargers with chronic toxicity monitoring targets, whenever the MDET or MMET is not met in a singular calendar month, but not both, dischargers with a less than monthly monitoring frequency are required to conduct an additional routine monitoring test. The additional routine monitoring test must be within two weeks after the calendar month in which the MDET or MMET was not met. The additional routine monitoring test will be used to determine if a TRE is necessary and could result in the need for additional MMET tests. Not meeting the MDET or MMET is not a violation of an effluent limitation.

This additional routine monitoring test is not required for dischargers that are already conducting monthly routine monitoring or dischargers that are already conducting a TRE.

E. Effluent Limitations

The Provisions aim to provide consistent protection of aquatic life beneficial uses in inland surface waters, enclosed bays, estuaries, and lagoons throughout the state from the effects of both known and unknown toxicants. Water quality objectives and effluent limitations are essential in establishing maximum levels of acceptable toxicity. Without clear, enforceable objectives and effluent limitations the Water Boards could not effectively control and reduce toxicity in surface waters. Consistent, understandable numeric water quality objectives and numeric effluent limitations are desirable, in that they provide a reliable level of protection and are not subject to interpretation or a variety of applications throughout the state.

In State Water Board Water Quality Order No. 2003-0012 (Los Coyotes Order), the State Water Board concluded that the propriety of including numeric effluent limitations for chronic toxicity is best addressed through a rule making action in order to allow full public participation and deliberation. The development and consideration of the Provisions through the rule making process provides that regulatory setting. Opportunities have been provided for public discussion and consideration, including public workshops, hearings, and opportunities to provide written comments.

In addition to considering public input on the Provisions, Water Board staff also relied on expert information and analysis in developing appropriate numeric water quality objectives and effluent limitations that are both achievable by dischargers and are protective of aquatic life in California. While the State Water Board was developing the Provisions, some Regional Water Boards adopted numeric water quality effluent limitations in NPDES permits that are similar to those that are in the Provisions. The implementation of those permits has demonstrated that the effluent limitations in the Provisions are both feasible and achievable for NPDES-permitted dischargers.

Maximum Daily Effluent Limitations

For chronic toxicity, a violation of the MDEL occurs when the most sensitive species toxicity test results in a “fail” at the IWC for the sub-lethal endpoint measured in the test and the percent effect for the survival endpoint is greater than or equal to 50 percent.

If there is no survival endpoint for the species tested (e.g., plant or algae species), then a “fail” at the IWC for any sub-lethal endpoint measured in the test and a percent effect for that sub-lethal endpoint is greater than or equal to 50 percent results in a MDEL violation.

For acute toxicity, a violation of the MDEL occurs when the toxicity test results in a “fail” at the IWC for the survival endpoint and the percent effect for the survival endpoint is greater than or equal to 50 percent.

Median Monthly Effluent Limitations

For chronic toxicity, if any chronic toxicity routine monitoring test results in a “fail” at the IWC, then the discharger is required to initiate two chronic toxicity MMEL compliance tests within the same calendar month. If more than one most sensitive species chronic toxicity test in a calendar month results in a “fail” at the IWC, then there is a violation of the MMEL.

For acute toxicity, MMEL compliances tests are prompted in the same way as chronic toxicity, but with acute toxicity tests. If any acute toxicity test results in a “fail” at the IWC, then the discharger is required to initiate two MMEL compliance tests within the same calendar month. If more than one most sensitive species acute toxicity test in a calendar month results in a “fail” at the IWC, then there is a violation of the MMEL.

The State Water Board will be conducting a study, in collaboration with stakeholders and laboratories, to investigate factors that can be controlled to reduce within-test and intra-laboratory variability and improve a laboratory’s performance over time in the *C. dubia* chronic reproduction toxicity test. The study is expected to be completed by December 31, 2022.

Table 2-2. MMEL Compliance

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

Routine Monitoring Test	Compliance Test 1	Compliance Test 2	MMEL Violation?
Fail	Fail	*NA	Yes

* NA = Not Applicable

The requirement to include the MMEL indicated in Section III.C.5.d (formerly Section IV.B.2.e.iv) using *C. dubia* as the most sensitive species shall take effect on a statewide basis starting January 1, 2024. For permits that are issued, renewed, reissued, or reopened after the effective date of the Toxicity Provisions and through December 31, 2023, if an effluent limitation is required to be included in the permit, then four scenarios will apply. In scenario 1, if the existing permit does not contain numeric effluent limitations for chronic toxicity and *C. dubia* is identified as the most sensitive species, then the permit shall include an MMET instead of an MMEL using *C. dubia* unless the MMEL is required by federal law. In scenario 3, if the existing permit does contain numeric effluent limitations for chronic toxicity and *C. dubia* is identified as the most sensitive species and an MMEL using *C. dubia* is not required by federal law, then the permitting authority will have a choice between option A, including the MMEL using *C. dubia*, or option B, an MMET using *C. dubia* and an MMEL using another species. The requirements in Scenario 1 and Scenario 3, Option B are only in effect through December 31, 2023. For those scenarios, the permit shall specify that starting January 1, 2024, dischargers must comply with the MDEL indicated in Section III.C.5.c (formerly Section IV.B.2.e.iii) and MMEL indicated in Section III.C.5.d (formerly Section IV.B.2.e.iv) of the Toxicity Provisions, using *C. dubia*. For permits that are issued, reissued, renewed, or reopened after December 31, 2023, if an effluent limitation is required to be included in the permit, the MDEL and MMEL in Section III.C.5.c (formerly Section IV.B.2.e.iii) and Section III.C.5.d (formerly Section IV.B.2.e.iv) must be included.

For all non-storm water NPDES dischargers, including POTW dischargers, only toxicity tests measured at the IWC, using the most sensitive species, and analyzed using the TST approach will be used to determine compliance with the chronic or acute MDEL and MMEL.

POTW Dischargers Authorized to Discharge at a Rate Equal to or Greater than 5 MGD

NPDES permits for POTW dischargers that are authorized to discharge at a rate equal to or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) must include the chronic MDEL and MMEL.

NPDES permits for POTW dischargers that are authorized to discharge at a rate equal to or greater than 5 MGD, are not required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020), and which have reasonable potential must also include the chronic MDEL and MMEL.

If the Water Boards require a reasonable potential analysis for acute toxicity and if reasonable potential is demonstrated, these NPDES permits must also include the acute MDEL and MMEL.

POTW Dischargers Authorized to Discharge at a Rate Less than 5 MGD

NPDES permits for POTW dischargers authorized to discharge at a rate less than 5 MGD which have reasonable potential must include the chronic MDEL and MMEL.

If the Water Boards require a reasonable potential analysis for acute toxicity and if reasonable potential is demonstrated, these NPDES permits must also include the acute MDEL and MMEL.

Other Non-Storm Water NPDES Dischargers

NPDES permits for non-storm water NPDES dischargers with reasonable potential for chronic toxicity must include a chronic MDEL and MMEL.

If the Water Boards require a reasonable potential analysis for acute toxicity and if reasonable potential is demonstrated, these NPDES permits must also include the acute MDEL and MMEL.

F. Monitoring Targets

All non-storm water NPDES discharger permits that that are not required to comply with the chronic toxicity MDEL and MMEL in the Provisions must include the chronic toxicity MDET and MMET in their NPDES permit for the purpose of determining if a TRE is required. Not meeting the MDET or MMET may require the implementation of a TRE. Not meeting the MDET or MMET is not a violation of an effluent limitation.

Chronic Maximum Daily Effluent Targets

For chronic toxicity, the MDET is not met when the toxicity test using the most sensitive species results in a “fail” at the IWC for the sub-lethal endpoint measured in the test and the percent effect for the survival endpoint is greater than or equal to 50 percent.

If there is no survival endpoint for the species tested (e.g., plant or algae species), the MDET is not met when the toxicity test results in a “fail” at the IWC for that sub-lethal endpoint measured in the test and a percent effect for that sub-lethal endpoint is greater than or equal to 50 percent.

Chronic Median Monthly Effluent Targets

For chronic toxicity, if any chronic toxicity routine monitoring test results in a “fail” at the IWC, then the discharger is required to initiate two chronic toxicity MMET tests within the same calendar month. If more than one chronic toxicity target test in a calendar month results in a “fail” at the IWC, then the MMET is not met.

For all non-storm water NPDES dischargers, including POTW dischargers, only toxicity tests measured at the IWC, using the most sensitive species, and analyzed using the TST approach will be used to determine if the MDET and MMET are being met.

G. Toxicity Reduction Evaluation

A TRE is a site-specific study conducted in a stepwise process designed to identify the causative agents of effluent toxicity, isolate sources of toxicity, evaluate the effectiveness of control options, and confirm a reduction in effluent toxicity (U.S. EPA, 1991).

For all non-storm water NPDES dischargers, including POTW dischargers, a TRE will be required when there are two or more targets that are not met or two or more effluent limitation violations within the same calendar month or within two consecutive calendar months. The combination of violations may be acute or chronic and may be any combination of two or more MDEL or MMEL violations. In addition, the Water Board may require a TRE if other information indicates persistent aquatic toxicity.

H. Mixing Zones and Dilution Credits

For all non-storm water NPDES dischargers, including POTW dischargers, the Water Boards have the option to grant mixing zones and dilution credits for acute or chronic toxicity to dischargers. The allowance is discretionary and determined on a discharge-by-discharge basis.

I. Flow-Through Acute Toxicity Systems

For all non-storm water NPDES dischargers, including POTW dischargers, the Water Boards have the discretion to require additional toxicity compliance provisions specific to existing or new flow-through acute toxicity systems. The Provisions would not require existing flow-through systems to accommodate the TST approach. If a discharger has reasonable potential for acute toxicity, a flow-through acute toxicity system cannot be used as a substitute for routine static acute monitoring requirements.

J. Additional Monitoring

The Water Boards have the discretion to require non-storm water NPDES dischargers, including POTW dischargers, to conduct additional toxicity testing, such as special studies, to add test species, or to assess higher than the IWC effluent concentrations. This additional monitoring cannot be used to determine compliance with the MDEL and MMEL.

K. Violation and Target Reporting

All non-storm water NPDES dischargers, including POTW dischargers, are required to notify the Water Boards of a violation of a toxicity MDEL or MMEL or when a MDET or MMET has not been met as soon as the discharger learns of the violation, or of not meeting the targets, but no later than 24 hours after the discharger receives the monitoring results.

L. Biological Pesticide and Residual Pesticide Discharges

For biological pesticide or residual pesticide discharges regulated by an NPDES permit, the Water Boards would have the option to exempt these discharges from some or all of the implementation requirements in the Provisions.

M. Drinking Water System Discharges

For drinking water system discharges, the Water Boards would have the option to exempt these discharges from some or all of the implementation requirements in the Provisions.

N. Discharges from Natural Gas Utility Construction, Operations and Maintenance Activities

The Water Boards would have the option to exempt discharges from hydrostatic testing, site dewatering, construction, testing, maintenance, or repair of natural gas facilities regulated by an NPDES permit from some or all of the implementation requirements in the Provisions.

O. Insignificant Dischargers

For certain insignificant non-storm water NPDES dischargers, the Water Boards would have the option to exempt these dischargers from some or all of the implementation elements in the Provisions.

II. Storm Water Dischargers

For chronic and acute toxicity, storm water dischargers that would be required to conduct monitoring using toxicity test methods described in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions would be required to meet the implementation requirements for the statistical approach, percent effect, and reporting in Sections III.B.3, III.B.4, and III.B.5 (formerly Sections IV.B.1.c, IV.B.1.d, and IV.B.1.e) of the Provisions.

III. Nonpoint Source Dischargers

For chronic and acute toxicity, nonpoint source dischargers that are required to conduct monitoring using toxicity test methods described in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions would be required to meet the implementation requirements for statistical approach, percent effect, and reporting in Sections III.B.3, III.B.4, and III.B.5 (formerly Sections IV.B.1.c, IV.B.1.d, and IV.B.1.e) of the Provisions.

2.7 Effective Date of the Provisions and Required Approvals

Generally, the Provisions become effective upon adoption by the State Water Board and approval by Office of Administrative Law and U.S. EPA, which typically occurs within a few months after the State Water Board adoption.

The implementation requirements contained in the Provisions would become effective for a specific discharger once the Water Boards incorporate the mandatory conditions into the discharger's permit or order. Insofar as the Provisions acknowledge that the Water Boards have discretion to include requirements for particular dischargers, those requirements would also become effective upon inclusion in the applicable permit. This process would generally be done permit-by permit as the permits are issued, modified, or renewed. Any new condition or requirement added or amended into a waste discharge requirement (WDR) could be implemented upon approval by OAL.

For storm water and nonpoint source dischargers that are required to conduct toxicity testing with test methods described in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions, the Water Boards would issue Water Code section 13383 orders or 13267 orders within one year of the effective date of the Provisions. The orders would require toxicity testing, analysis, and reporting to be conducted in accordance with the Provisions commencing within one year from the date of the order.

2.8 Environmental Review and Consultation Requirements

The Staff Report includes the State Water Board's Substitute Environmental Documentation (SED) required to satisfy the provisions of the CEQA, pursuant to Public Resources Code sections 21080.5 and 21159, CEQA Guidelines sections 1520 through 15253, and the State Water Board's Regulations for Implementation of the California Environmental Quality Act of 1970, California Code of Regulations (Cal. Code of Regs), title 23, sections 3720 through 3781. These requirements are listed below, along with other regulatory process requirements.

2.8.1 California Environmental Quality Act

CEQA authorizes the Secretary for Natural Resources to certify that state regulatory programs meeting certain environmental standards are exempt from the preparation of a separate EIR, negative declaration, or initial study (Pub. Resources Code, § 21080.5). The Secretary for Natural Resources has certified as exempt the State Water Board's Basin/208 Planning Program for the protection, maintenance, and enhancement of water quality in California. (Cal. Code Regs., tit. 14, § 15251(g)). Exempt regulatory programs include the Water Boards' adoption or approval of water quality standards and provisions to implement water quality standards, such as the Provisions (Cal. Code Regs., tit. 23, § 3775-3781). Therefore, the Staff Report includes the SED for compliance with CEQA, and a separate CEQA document will not be prepared. The State Water Board must still comply with CEQA's goals and policies, including the policy of avoiding significant adverse effects on the environment where feasible (Cal. Code. Regs. tit. 14, § 15250).

According to the State Water Board regulations for the implementation of CEQA (Cal. Code Regs., tit. 23, § 3777), the SED shall consist of a written report prepared for the State Water Board containing an environmental analysis of the project; a completed Environmental Checklist (where the issues identified in the checklist must be evaluated in the checklist or elsewhere in the SED); and other documentation as the State Water Board may include. The SED is required to contain, at a minimum, the information contained in Table 2-3 below.

Table 2-3. Required Information for Staff Report and Substitute Environmental Documentation

Required Information	Staff Report Chapter
1. A brief description of the project	Chapters 2, 5
2. An identification of any significant or potentially significant adverse environmental impacts of the proposed project	Chapter 7
3. An analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts; and	Chapters 5, 7, 8
4. An environmental analysis of the reasonably foreseeable methods of compliance. The environmental analysis shall include, at a minimum, all of the following:	
a. An identification of the reasonably foreseeable methods of compliance with the project;	Chapter 6
b. An analysis of any reasonably foreseeable significant adverse environmental impacts associated with those methods of compliance;	Chapter 7
c. An analysis of reasonably foreseeable alternative methods of compliance that would have less significant adverse environmental impacts; and	Chapters 6, 7, 8
d. An analysis of reasonably foreseeable mitigation measures that would minimize any unavoidable significant adverse environmental impacts of the reasonably foreseeable methods of compliance	Chapter 7

2.8.2 Early Public Consultation and Scoping

CEQA requires the State Water Board seek early public consultation with public agencies and members of the public prior to circulating the draft SED (Cal. Code Regs., tit. 23, § 3775.5, subd. (a)). The consultation may include one or more scoping meetings to engage the stakeholders and public agencies early in the planning and formulation stages of the project to scope the range of actions, alternatives, reasonably foreseeable methods of compliance, significant impacts, and cumulative impacts, if any, that should be analyzed in the study and mitigation measures that will reduce impacts to a less than significant level, and to eliminate from the project any elements found not to be important (Cal. Code Regs., tit. 23, § 3775.5, subd. (b)). A scoping meeting for the Provisions was held on January 17, 2006, in Sacramento, California at the California Environmental Protection Agency (CalEPA) headquarters building.

Oral and written comments were received during the scoping meeting and were considered in the development of the Provisions.

2.9 Focused Public Outreach

In July of 2010, staff distributed the *Draft Policy for Whole Effluent Toxicity Assessment and Control* to the public and requested input regarding the draft toxicity policy. State Water Board staff considered the public comments and suggestions from the 2010 draft toxicity policy. In 2012 the toxicity policy was re-released. Since that time, the toxicity policy was changed to a plan and other changes were made to create the draft Toxicity Provisions.

State Water Board staff held three targeted outreach meetings in August and September of 2013, and six targeted outreach meetings in April, May, and June of 2017. Additionally, staff held one targeted outreach meeting in September of 2018, sixteen targeted outreach meetings in 2019, and two targeted outreach meetings in June 2020. During these meetings, staff discussed and solicited feedback on the Provisions' key elements. Meetings were held with representatives of POTW and industrial dischargers, recycled water dischargers, a toxicity testing laboratory, regulatory agencies, storm water dischargers, nonpoint source dischargers including agricultural dischargers, environmental groups, non-governmental organizations, tribes, and water supply agencies. See Table 2-4 for the date and locations of the focused outreach meetings.

Remote access was provided for all of the 2013 and 2017 focused outreach meetings. For the August and September 2013 outreach meetings, participants were provided a fact sheet on the Provisions. In the April and May 2017 outreach meetings, participants were provided an issue paper that included an overview of the fundamentals of the Provisions and a staff draft copy of the Provisions. Documents from these meetings and the 2007 scoping meeting are available at: the Statewide Toxicity Provisions program web page. https://www.waterboards.ca.gov/water_issues/programs/state_implementation_policy/tx_ass_cntrl.shtml

Table 2-4. Focus Group Meetings

Group	Location, Date
POTW and Industrial Dischargers	Sacramento, August 27, 2013
Regulatory Agencies	Sacramento, August 29, 2013
Storm Water and Nonpoint Source Dischargers (Agriculture)	Sacramento, September 23, 2013
POTW and Industrial Dischargers	Sacramento, April 11, 2017
Environmental Groups, Non-Governmental Organizations, and Tribes	Sacramento, April 12, 2017
Storm Water and Nonpoint Source Dischargers (Agriculture)	Sacramento, April 24, 2017
Water Supply Agencies	Sacramento, May 18, 2017
Western States Petroleum Association	Sacramento, June 13, 2017
Wastewater Dischargers	Sacramento, June 22, 2017
Environmental Groups	Sacramento, September 10, 2018
Wastewater Dischargers	Sacramento, February 7, 2019
Environmental Groups	Sacramento, April 3, 2019
Storm Water Dischargers	Sacramento, April 4, 2019
Industrial Dischargers	Sacramento, April 5, 2019
Water Supply Agencies	Sacramento, April 9, 2019
Wastewater Dischargers	Sacramento, May 7, 2019
Wastewater Dischargers	Sacramento, June 11, 2019
Wastewater Dischargers	Teleconference, July 31, 2019
Storm Water Dischargers	Sacramento, August 7, 2019
Toxicity Laboratory	Teleconference, September 6, 2019
Environmental Groups	Sacramento, September 9, 2019
Storm Water Dischargers	Sacramento, September 17, 2019
Wastewater Dischargers	Sacramento, September 18, 2019
Wastewater Dischargers	Sacramento, September 19, 2019
Recycled Water Dischargers	Sacramento, September 30, 2019
POTW Dischargers	Sacramento, October 1, 2019

Group	Location, Date
Environmental Groups	Remote, June 2, 2020
POTW Dischargers	Remote, June 25, 2020
Wastewater Dischargers	Remote, August 13, 2020

2.10 Consultation with California Native American Tribes

Executive Order B-10-11 provides that it is the policy of the administration of the Governor of the State of California that every state agency encourage consultation and communication with California Indian Tribes and permit tribal governments to provide meaningful input in the development of regulations, rules, and policies that may affect tribes.

California State Assembly Bill (AB) 52 (Gatto 2014) established a new category of resources in CEQA called Tribal Cultural Resources:

“Tribal Cultural Resources are either of the following: (1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following: (A) Included or determined to be eligible for inclusion in the California Register of Historical Resources. (B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1. (2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe. (Pub. Resources Code, § 21074)”

The Public Resource Code includes a consultation process with California Native American tribes. Consultation with a California Native American tribe that has requested such consultation may assist a lead agency in determining whether the project may adversely affect tribal cultural resources, and if so, how such effects may be avoided or mitigated. The Public Resources Code requires formal notice to California tribes of an opportunity to consult with the lead agency prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report if the tribe is traditionally and culturally affiliated with the geographic area of the proposed project.

The requirements to consider tribal cultural resources and to consult with California tribes apply to CEQA projects for which the lead agency issues a notice of preparation or a notice of intent to adopt a negative declaration or mitigated negative declaration, or EIR on or after July 1, 2015. The State Water Board considers AB 52’s requirements as also applying to an SED.

In addition to the focused public outreach described above, letters were sent via certified mail to 14 Tribes in February and March 2016, including all of the California tribes who, at the time, requested to receive AB 52 notices. All delivery receipts were received by the State Water Board by April 13, 2016. Formal consultation was requested by four tribes, the Wilton Rancheria, Ohlone/Costanoan-Esselen Nation, Wiyot Tribe, and the United Auburn Indian Community. State Water Board staff subsequently met with representatives from the tribes in separate meetings during September and October of 2016, to provide an overview of the Provisions, answer any questions, and provide an opportunity for input. None of the tribes requested any changes to the Provisions. Although the formal consultation with each of the tribes has concluded, the tribes were informed that they may continue to provide input on the project through the public participation process.

2.11 Public Workshops and Hearings

The State Water Board held public workshops and hearings related to the Toxicity Provisions. The project was designed as a proposed statewide policy prior to 2013, but has since changed to be a water quality control plan. Previous and upcoming meetings are displayed in Table 2-5 below.

Table 2-5. Public Workshops and Hearings

Meeting	Date	Purpose
State Water Board Workshop on the Toxicity Policy	November 16, 2010	Receive Oral Comments
Staff Workshop on the Toxicity Policy	August 22, 2011	Discussion of Draft Toxicity Policy
State Water Board Hearing on the Toxicity Policy	August 21, 2012	Receive Oral Comments
Staff Workshop on the Provisions	October 29, 2018 and October 31, 2018	Discussion of Provisions
State Water Board Hearing on the Provisions	November 28, 2018	Receive Oral Comments
Staff Workshop on the Provisions	August 13, 2019 and August 16, 2019	Review of First Revised Draft of the Provisions
Staff Workshop on the Provisions	August 28, 2019	Discussion of First Revised Draft of the Provisions
Board Workshop on the Provisions	October 3, 2019	Discussion of First Revised Draft of the Provisions
Staff Workshop on the Provisions	November 15, 2019	Discussion of Toxicity Provisions
Staff Workshop on the Provisions	January 9, 2020	Discussion of Appendix J and K
Staff Workshop on the Provisions	July 29, 2020	Discussion of Second Revised Draft of the Provisions

2.12 Scientific Peer Review

The California Health and Safety Code section 57004 requires external scientific peer review of the scientific basis for any rule proposed by any board, office, or department within the CalEPA. Scientific peer review is a mechanism for ensuring that the scientific portions of regulatory decisions and initiatives are based on sound science. Scientific peer review also helps strengthen regulatory activities, establishes credibility with stakeholders, and ensures that public resources are managed effectively.

The external peer reviewers prepare a written report that contains an evaluation of the scientific basis of the proposed rule. If a review finds that the State Water Board has failed to demonstrate that the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices, the report shall state that finding, and the reasons explaining the finding (Health & Safety Code, § 57004, subd. (d)(2)). In such a case, if the State Water Board disagrees with any aspect of the finding of the external scientific peer review, it shall explain its disagreement and include as a part of the administrative record for the rule “its basis for arriving at such a determination in the adoption of the final rule, including the reasons why it has determined that the scientific portions of the proposed rule are based on sound scientific knowledge, methods, and practices” (Health & Safety Code, § 57004, subd. (d)(2)).

The scientific validity of the TST has been vetted by seven external peer reviewers; five of which were selected via U.S. EPA's peer review process, while the remaining two were selected via the State Water Board's peer review process. In addition, the academic peer-reviewed journals *Environmental Toxicology and Chemistry*, and *Integrated Environmental Assessment and Management* each accepted and published an article about the TST Approach. (Denton et al. 2011; Diamond et al. 2011.)

The U.S. EPA conducted a peer review of the TST approach in 2008, as detailed below in Section 2.12.1 of the Staff Report. External scientists conducted peer review of the TST approach for publication in scientific journals in 2011, as described in Section 2.12.2 of the Staff Report. The State Water Board then conducted an independent peer review of the project, which was completed in 2012, as described in section 2.12.3 of the Staff Report.

2.12.1 U.S. EPA Peer Review of the Evaluation of the Test of Significant Toxicity

An external peer review was conducted by U.S. EPA’s Office of Wastewater Management (OWM), and the Draft TST Technical Document was released on May 20, 2008. Using the guideline for U.S. EPA’s peer review process (U.S. EPA 2006), OWM prepared the peer review questions and the review was conducted by the independent contractor, Avanti. Questions along with the May 20, 2008 Draft TST Technical Document were submitted to five external peer reviewers by the contractor.

The five reviewers were independently selected, based on their qualifications, by the contractor. Avanti summarized the comments and removed any information which would identify the reviewers and submitted the summary review document to OWM. The external peer reviewers recommended keeping the bioequivalence value *(b*) at a fixed risk management level based on ecological information and not dependent on test method performance or test design. The peer reviewers unanimously concurred that the recommended bioequivalence approach incorporated in the TST approach is a sound direction for the whole effluent toxicity (WET) program. There was also consensus among peer reviewers that the analytical approach used to develop the TST approach, and the results of the TST approach, were reasonable and defensible. Some peer reviewers commented that the dependence on empirical WET data used in the initial approach was somewhat limiting and that future analyses should also include simulations or other tools to obtain true population error rates when the TST approach is used.

As a result of the peer review, the final TST approach was refined. In particular, bioequivalence value (*b*) values were set at 0.75 for chronic WET test statistical endpoints and 0.80 for acute WET test statistical endpoints. More extensive Monte Carlo simulation analyses were conducted to develop population false positive and false negative rates using RMDs for unacceptable toxicity (25 percent effect for chronic statistical endpoints and 20 percent effect for acute statistical endpoints), and for acceptable toxicity (10 percent for all statistical endpoints). The May 20, 2008 Draft TST Technical Document was revised and updated to reflect the external peer review comments, editorial improvements, and internal U.S. EPA suggestions.

The final technical document released in June 2010 is titled: National Pollution Discharge Elimination System Test of Significant Toxicity Technical Document.

A synopsis of the peer review, including questions and responses, is available here: Synopsis of Peer Review of TST Approach.
https://www.waterboards.ca.gov/water_issues/programs/state_implementation_policy/docs/tst_peerreview.pdf

2.12.2 Journal Articles

Two peer-reviewed journal articles were written that delineate the technical underpinnings of the final TST approach and demonstrate the benefits to both regulatory authorities and permitted entities. These articles were published in separate internationally peer reviewed journals. The first journal article, titled *Test of Significant Toxicity: A statistical application for assessing whether an effluent or site water is truly toxic*, written by Debra Denton, Jerry Diamond, and Lei Zheng, was published on March 18, 2011 in the Journal of Environmental Toxicology and Chemistry. The second journal article, titled *It is time for a change in the analysis of whole effluent toxicity data*, written by Jerry Diamond, Debra Denton, Brian Anderson, and Bryn Phillips, was published on November 18, 2011 in the Journal of Integrated Environmental Assessment and Management. The State Water Board determined these articles demonstrated support for the scientific validity of the TST statistical approach, and therefore the Staff Report references the articles.

2.12.3 Water Boards Peer Review of the Evaluation of the Test of Significant Toxicity

Scientific peer review on the scientific elements of the 2011 Draft Policy for Toxicity Assessment and Control was conducted through an Interagency Agreement between CalEPA and the University of California. The peer review process commenced on December 11, 2011 and concluded on January 31, 2012. Two peer reviewers were selected and participated in reviewing the scientific elements of the 2011 Draft Staff Report. The two peer reviewers are Gerald A. LeBlanc, Ph.D., Professor of Environmental and Molecular Toxicology, Department of Environmental and Molecular Toxicology, North Carolina State University; and Michael C. Newman, Ph.D., Marshall Acuff Jr. Professor of Marine Science, of the Department of Environmental and Aquatic Animal Health, Virginia Institute of Marine Science, at the College of William and Mary. Dr. Michael C. Newman has expertise in statistical approaches related to toxicity testing and extensive knowledge of traditional hypothesis testing, point estimate techniques and/or bioequivalence testing. Dr. Gerald A. LeBlanc has expertise in environmental toxicology with an emphasis on vertebrates, invertebrates, and aquatic plants and algae.

Since the peer review, changes were made from the 2011 Draft Policy for Toxicity Assessment and Control to the current draft of the Toxicity Provisions, including the decision to develop a plan instead of a policy. Even with these changes, the scientific basis of the Toxicity Provisions remains unchanged. Therefore, the peer review analyses and conclusions are still valid. Both peer reviewers agree that the TST is a scientifically sound way of determining the presence of toxicity in a clear and non-ambiguous way. They support the use of the TST as a statewide tool.

The peer review was supportive of the scientific basis of the project. The peer review response is available at:

Water Boards Peer Review page

https://www.waterboards.ca.gov/water_issues/programs/peer_review/toxicity_assessment_control.shtml

2.13 Water Code Section 13241

In accordance with Water Code section 13241, the Water Boards are required to establish water quality objectives to "ensure the reasonable protection of beneficial uses and the prevention of nuisance." These and other factors are addressed throughout the Staff Report as identified in Table 2-6.

Table 2-6. Water Code Section 13241

Factor to Consider	Water Code Section	Chapter and Section
Past, present and probable future beneficial uses of water.	13241(a)	9.1.1
Environmental characteristics and water quality of the hydrographic unit under consideration, including the quality of the water available thereto.	13241(b)	9.1.2
Water quality conditions that could be reasonably attained through coordinated control of all factors affecting water quality.	13241(c)	9.1.3
Economic considerations.	13241(d)	9.1.4
The need for developing new housing within the region.	13241(e)	9.1.5

Factor to Consider	Water Code Section	Chapter and Section
The need to develop and use recycled water.	13241(f)	9.1.6

2.14 Project Contacts

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Toxicity Provisions Program Website

https://www.waterboards.ca.gov/water_issues/programs/state_implementation_policy/tx_ass_cntrl.html

Updates on the Provisions can be obtained by subscribing to the electronic subscription mailing list (listserv) for the “Freshwater Plans and Policies” which may be found at the:
Email List Subscription Form website
https://www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.html

3 REGULATORY BACKGROUND

3.1 Regulatory Background and Authority

The Federal Water Pollution Control Act of 1972, as amended (33 U.S.C. § 1251 et seq. (Clean Water Act) "is a comprehensive water quality statute designed to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." (33 U.S.C § 1251(a).) The Clean Water Act directs states to adopt water quality standards "to protect the public health or welfare, enhance the quality of water and serve the purposes of this [Act]." (33 U.S.C. § 1313(c).)

Water quality standards generally consist of three components: designated uses for each water body or segment, water quality criteria (referred to as water quality objectives under California law) to protect the designated uses, and an antidegradation policy (40 CFR §131.6; 40 CFR § 131.13). In general, "uses" refer to what a water body is or potentially may be used for (40 CFR § 131.3(f)), with examples as diverse as use as wildlife and riparian habitat, use of water for industrial production, agricultural supply, or use for recreation due to activities such as fishing and swimming in water bodies. (40 CFR.131.10(a).) Most, if not all, water bodies have multiple uses. "Existing uses" are "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." (40 CFR § 131.3(e).) "'Designated uses' are those uses specified in water quality standards for each water body or segment whether or not they are being attained." (40 CFR § 131(f).) "Water quality criteria" are "expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use." (40 CFR § 131.3(b).) The Federal Antidegradation policy provides three levels (tiers) of water quality protection to maintain and protect existing water uses, high quality waters, and outstanding national resource waters. (40 CFR § 131.12.).

The Porter-Cologne Water Quality Control Act (Wat. Code § 13000 et seq.) is the principal law governing water quality in California. California law designates the State Water Board and the nine Regional Water Boards as the principle state agencies for enforcing federal and state water pollution law. (Wat. Code, §§ 13140, 13160, 13225, 13240.). The Porter-Cologne Water Quality Control Act establishes a comprehensive statutory program to protect the quality and "beneficial uses" (or "designated uses" under federal parlance) of waters of the state. Beneficial uses include, but are not limited to, "domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves." (Wat. Code, § 13050, subd.(f)).

Pursuant to California Water Code section 13241, regulatory protection of beneficial uses is carried out, in part, through water quality objectives (or "water quality criteria'' under federal parlance) established by each of the Regional Water Quality Control Boards (Regional Water Boards) or by the State Water Board. Beneficial uses of water bodies, water quality objectives designed to protect those uses, a corresponding implementation program, and an antidegradation policy constitute a complete water quality standard.

The National Pollutant Discharge Elimination System (NPDES) Program is a federal program which has been delegated to the State of California for implementation through the State Water Resources Control Board (State Water Board) and the nine Regional Water Quality Control Boards (Regional Water Boards), collectively Water Boards. In California, NPDES permits are also referred to as WDRs that regulate discharges to waters of the United States. Under the Clean Water Act, a discharger must obtain an NPDES permit prior to discharging any pollutant from a point source into waters of the US. (33 U.S.C. § 1342.).

NPDES permits must contain effluent limitations that control all pollutants that "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality." (40 CFR § 122.44(d)(1)(i).) As defined in the Clean Water Act, *Effluent limitation* means any restriction on "quantities, discharge rates, and concentrations of 'pollutants' which are 'discharged' from 'point sources' into 'waters of the United States,' the waters of the "contiguous zone," or the ocean." (40 CFR § 122.2). States are not precluded from omitting or modifying any provisions of the Clean Water Act to impose more stringent requirements. (40 CFR 123.25(a).).

The Porter-Cologne Water Quality Control Act authorizes the State Board to formulate, adopt, and revise state water policy, which may include water quality objectives, principles, and guidelines. (Water Code § 13140-13143). The State Water Board may also adopt water quality control plans for waters of the state. Regional Water Boards are required to establish regional water quality control plans, also known as basin plans, for all areas within their regions (Wat. Code, §13240). Statewide water quality control plans automatically supersede regional water quality control plans to the extent of any conflict between the two plans for the same waters. (Wat. Code, § 13170.)

The State Water Board is authorized to adopt state policy for water quality control. (Water Code § 13140.) The components of state policy for water quality control include all or any of the following: (1) water quality principles and guidelines for long-range resource planning, including ground water and surface water management programs and control and use of recycled water, (2) water quality objectives at key locations for planning and operation of water resource development projects and for water quality control activities, and (3) other principles and guidelines deemed essential by the State Water Board for water quality control. (Wat. Code, § 13142.)

The permissible contents of water quality control plans pursuant to Water Code section 13170 overlap with the permissible contents of policies for water quality control pursuant to Water Code section 13140. In some cases, the State Water Board acts under the authority of both Water Code sections 13170 and 13140.

State policy for water quality control may supersede conflicting provisions in regional water quality control plans where the State Water Board determines it is appropriate. (*WaterKeepers Northern California v. State Water Resources Control Bd.* (2002) 102 Cal.App.4th 1448, 1460.) Pursuant to Water Code, section 13146, "State offices, departments and boards, in carrying out activities which affect water quality, shall comply with state policy for water quality control unless otherwise directed or authorized by statute, in which case they shall indicate to the state board in writing their authority for not complying with such policy." This section applies to the Regional Water Boards. (*Cf. State Water Resources Control Bd.* Cases (2006) 136 Cal. App. 4th 674, 730 [interpreting analogous language in Water Code section 13247 as applying to the State Water Board].)

Section 303(c)(2)(B) of the Clean Water Act (33 U.S.C. § 1313) requires states to adopt water quality criteria (i.e., water quality objectives) for all priority pollutants (33 U.S.C. § 1317(a)). In 1994, the State Water Board and U.S. EPA agreed to a coordinated approach to address priority toxic pollutants in inland surface waters, enclosed bays, and estuaries of California. In March 2000, State Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) to implement priority toxic pollutant criteria.

The California Toxics Rule was promulgated by U.S. EPA in May 2000. In 2005, the State Water Board amended the SIP to provide a mechanism to implement the water quality criteria established in the CTR. The SIP contains implementation provisions for priority toxic pollutant criteria found within the National Toxics Rule, the CTR, and for priority pollutant objectives found in basin plans.

In addition, the SIP contains minimum requirements for implementing narrative toxicity objectives in the basin plans. In Order WQO 2003-0012, the State Water Board determined that (1) the propriety of including numeric effluent limitations for chronic toxicity in NPDES permits for publicly-owned treatment works should be considered in a regulatory setting, in order to allow for full public discussion and deliberation; and (2) the SIP be modified to specifically address the issue. In Resolution No. 2005-0019, the State Water Board directed staff to introduce an amendment to the SIP to address narrative toxicity control provisions. In 2012, staff were directed to incorporate toxicity control provisions as an amendment to the Water Quality Control Plan for Enclosed Bays and Estuaries of California.

The ISWEBE Plan will be established in the future by the State Water Board under authority provided by Water Code section 13170. In accordance with Water Code section 13170, except where otherwise noted, the ISWEBE Plan would supersede any Regional Water Quality Control Plans (basin plans) for the same waters to the extent of any conflict. The ISWEBE Plan may also be used by the State Water Board in the future on a case-by-case basis to include state policies for water quality control to the extent they address waters of the United States. The Porter-Cologne Water Quality Control Act authorizes the State Water Board to formulate, adopt, and revise state water policy, which may include water quality objectives, principles, and guidelines. (Water Code § 13140-13143). In some cases, including these Toxicity Provisions, the State Water Board acts under the authority of both section 13170 and section 13140. As a result, the Toxicity Provisions will apply to all waters of the State as state policy for water quality control and will be incorporated into the ISWEBE Plan in the future for waters of the United States.

3.1.1 Statement of Necessity for the Toxicity Provisions

The appropriate form and implementation of toxicity limitations are not clearly defined and, as a result, Regional Water Boards have not consistently established toxicity effluent limitations in permits. On September 16, 2003, the State Water Board adopted Water Quality Order 2003-0012 which (1) determined the propriety of including numeric effluent limitations for chronic toxicity in NPDES permits for publicly-owned treatment works should be considered in a regulatory setting, in order to allow for full public discussion and deliberation; and (2) indicated that the SIP would be modified to specifically address the issue. On October 15, 2003, the State Water Board adopted Resolution No. 2003-0070, which directed State Water Board staff to begin revisions on the SIP to modify narrative toxicity control provisions. On February 24, 2005, the State Water Board adopted Resolution No. 2005-0019, which directed State Water Board staff to introduce an amendment to the SIP to address narrative toxicity control provisions by January 2006. Narrative water quality objectives are often translated into numeric criterion when setting numeric effluent limitations in permits. This translation can lead to inconsistency between the Regions. Adoption of numeric water quality objectives improves the Water Board's ability to establish consistent toxicity effluent limitations across the state, thereby ensuring protection of aquatic life beneficial uses.

3.2 Existing Toxicity Objectives

The National Toxics Rule (NTR) establishes water quality criteria, or water quality objectives, for priority toxic pollutants (40 CFR § 131.36). The CTR establishes water quality criteria for a total of 126 priority pollutants (40 CFR § 131.38). Additional water quality objectives for some priority toxic pollutants are established in the Regional Water Boards' basin plans. Each basin plan includes narrative objectives for aquatic toxicity, described in more detail below. However, there are currently no consistent statewide narrative or numeric aquatic toxicity water quality objectives (or criteria) for the protection of aquatic life and habitat.

In addition to the statewide CTR criteria, all nine Regional Water Boards have a narrative objective for aquatic toxicity in their basin plan that is similar to the following language: "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life" (from the Central Valley Regional Water Quality Control Board's (Central Valley Regional Water Board) Water Quality Control Plan for the Sacramento and San Joaquin River Basins, p. III-8.01, Central Valley Water Board 2009). Some of the basin plans also contain specific numeric triggers and testing requirements (See Appendix D for the existing narrative objectives in the basin plans).

3.3 Water Quality Assessment

Section 303(d) of the Clean Water Act (33 U.S.C. § 1313 (d)) and 40 CFR § 130.7(b) requires states to identify water bodies where technology-based effluent limitations and other required controls fail to meet water quality objectives and are not supporting their beneficial uses. These substandard or impaired waters are placed on the Clean Water Act section 303(d) List of Water Quality Limited Segments.

In the 2016 California Integrated Report (State Water Resources Control Board, 2018) approved by U.S. EPA on April 8, 2018, excluding ocean waters and open bays, 323 California water bodies are listed as impaired because of known or unknown toxicity, including over 302,025 acres of enclosed Bays & Harbors, Estuaries, Lakes & Reservoirs and 4,361 miles of Rivers and Streams. Appendix F contains a list of water bodies impaired for known and unknown toxicity from the 2016 Integrated Report.

3.4 Total Maximum Daily Loads and Site-Specific Objectives

3.4.1 Total Maximum Daily Loads

Section 303(d) of the Clean Water Act requires states to identify water bodies where effluent limitations and other required controls fail to meet water quality objectives and are not supporting their beneficial uses (referred to as impaired waters). These impaired waters are placed on the Clean Water Act section 303(d) List of Water Quality Limited Segments (impaired water bodies). For waters on this list (and where the U.S. EPA administrator deems they are appropriate) the states are to develop TMDLs. A TMDL must account for all sources of the pollutants that caused the water to be listed. Federal regulations require that the TMDL, at a minimum, account for contributions from point sources (federally permitted discharges) and contributions from nonpoint sources. The TMDL includes a calculation of how much the pollutant loading must be reduced and a plan of action to do so. A TMDL is not fully self-implementing but serves as an informational tool or goal for the establishment of further pollution controls.

Although waters may be listed as an impaired water body for both known and unknown toxicants, if the toxicant responsible for the impairment is unknown, an assessment is typically conducted to discover the cause of toxicity prior to the development of a TMDL. Therefore, few TMDLs address aquatic toxicity. However, in January 2018 there were approximately 68 TMDLs approved by U.S. EPA for known toxicants, such as metals, pesticides, and chloride, in California. In addition, there were 35 TMDLs for nitrogen or other related biostimulatory substances which may cause or contribute to toxicity in ambient waters. The TMDLs listed below are examples of TMDLs that use whole effluent toxicity tests.

Six TMDLs that address toxicity include:

- The Total Maximum Daily Load for Toxicity, Chlorpyrifos, and Diazinon in the Calleguas Creek, its Tributaries and Mugu Lagoon was adopted into the Los Angeles Regional Water Board's Basin Plan as Resolution No. R4-2005-009. This TMDL sets load allocations (LAs) and waste load allocations (WLAs) for chlorpyrifos and diazinon, as well as a TMDL for toxicity using a chronic Toxic Unit (TU_c) limit of 1.0 using the no observed effect concentration (NOEC) approach. In this TMDL, an exceedance of 1.0 TUc, using the NOEC approach, triggers a TRE.

- The Salinas River Watershed Sediment Toxicity and Pyrethroid Pesticides in Sediment TMDL, was adopted by the Central Coast Regional Water Board as Resolution No. R3- 2016-0003. This TMDL uses an "additive" TU for pyrethroids in sediment. This is defined as a sum of toxicity units for individual types of pyrethroids. Each individual pyrethroids TU is defined as the measured concentration of pyrethroids in a sample divided by the specific median lethal concentration (LC_{50}) concentration of pyrethroids. When the sum of the individual TUs exceeds 1.0 TUs, the TMDL exceeds the numeric target for the TMDL.

- The Total Maximum Daily Load for Diazinon and Pesticide-Related Toxicity in Bay Area Urban Creeks was adopted by the San Francisco Regional Water Quality Control Board (San Francisco Regional Water Board) as a basin plan amendment in Resolution No. R2-2005-0063. The toxicity TMDLs are assigned to storm water outfalls for storm water dischargers in the San Francisco Region. There are two TMDLs that assign a target of 1.0 TUs, one for acute and one for chronic toxicity. The acute target uses a NOAEC (no observed adverse effect concentration) approach and the chronic uses a NOEC. Every storm water outfall is assigned 1.0 TU allocations.

- The Central Valley Regional Water Quality Control Board's Resolution No. R5-2017-0057 was adoption as the Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges. This amendment uses a biological endpoint to evaluate a TMDL for pyrethroid toxicity in sediment. The biological endpoint is the 10-day survival of *Hyalella azteca*. The TMDLs are specifically for pyrethroid pesticides.

- The Pajaro River Watershed Chlorpyrifos and Diazinon TMDL was adopted by the Central Coast Regional Water Board as Resolution No. R3-2013-0011. This TMDL uses the biological endpoints of survival and reproduction of *Ceriodaphnia dubia* as stated in the basin plan.

- The Santa Maria River Watershed Toxicity and Pesticide TMDL was adopted by the Central Coast Regional Water Board as a basin plan amendment through Resolution No. R3-2014-0009. The TMDL uses the biological endpoints of survival and reproduction of *Ceriodaphnia dubia* to evaluate the toxic effects of pesticides.

3.4.2 Site-specific Water Quality Objectives

The only site-specific water quality objective in the state is found in Colorado River's Basin plan, which is in addition to the basin plan's region-wide narrative toxicity objective. The Mexican- American Water Treaty titled "Recommendations for Solution of the New River Boarder Sanitation Problem at Calexico, California – Mexicali, Baja California Norte" was approved by the Governments of the United States and Mexico effective on December 4, 1980. Minute No. 264 specifies qualitative and quantitative standards for the New River at the lagoon discharge canal, upstream of the discharge canal, at the international boundary, and upstream of the international boundary in Mexico. The qualitative and quantitative standards for the New River Minute No. 264 are incorporated into the Colorado River Regional Water Board's basin plan as narrative and numeric water quality objectives (REF 3-7 of the Colorado Regional Board basin plan). The site-specific water quality objectives for the New River include only narrative water quality objectives for aquatic toxicity. This narrative objective is consistent with Colorado River Regional Water Board's narrative toxicity water quality objective for all surface waters. The narrative water quality objective for the New River states:

> "The waters shall be free from substances that may be discharged into the River as a result of human activity in concentrations which are toxic or harmful to human, animal or aquatic life or which may significantly impair the beneficial uses of such waters."

4 ENVIRONMENTAL SETTING

4.1 Current Toxicity Testing Requirements

As described in Chapter 3, toxicity in California is currently regulated through narrative water quality objectives established in each of the Regional Water Boards' basin plans and implementation requirements found in the SIP. The regulatory measures used to determine compliance with these toxicity objectives vary, as existing NPDES permits and WDRs may contain numeric effluent limitations, and/or triggers for additional actions. The SIP requires the Regional Water Boards to use specific U.S. EPA test methods to determine compliance with narrative chronic toxicity objectives.

The SIP requires chronic toxicity tests to be conducted on at least one species of aquatic plant/algae, one vertebrate, and one invertebrate during an initial screening period; after which the most sensitive organism may be used for monitoring purposes. If repeated tests reveal toxicity, or if a discharge causes or contributes to toxicity in a receiving water body, then a TRE must be performed by the discharger. The SIP allows multiple dischargers to coordinate TRE implementation if they discharge to the same water body. Failure to comply with required toxicity testing and TRE studies within a designated period will result in appropriate enforcement action (State Water Board 2005b). While the SIP does not address acute toxicity tests, U.S. EPA has published approved methodology and recommendations for acute toxicity monitoring (U.S. EPA 2002a).

4.2 Assessment of Toxicity in California

Water Board staff, with assistance from the University of California, Davis, used existing toxicity data from the Surface Water Ambient Monitoring Program (SWAMP) and the California Environmental Data Exchange Network (CEDEN) databases to assess toxicity in each of the Water Board's regions. A report was prepared to summarize the findings of monitoring conducted by SWAMP and associated programs between 2001 and 2010 (Anderson et al., 2010). This is the most recent assessment report that is available. CEDEN is a statewide database that includes data produced by research and volunteer organizations. Table 4-2 displays information about the data used in the report, including date range, test methods, water type used, number of sites tested, and results.

For the assessment, data were originally submitted to the SWAMP/CEDEN databases, and a variety of statistical approaches were used to assess the data. In order to standardize the analysis of the entire data set, all control-sample comparisons were re-analyzed using the proposed TST statistical approach. Toxicity data were considered applicable for this analysis only if the toxicity test controls met test acceptability criteria as set by the test method protocols. To control for variation in test organism performance, every test result was expressed as a percentage of the survival or cell density observed in the laboratory control. Individual samples were then categorized as non-toxic or as having some toxicity, moderate toxicity, or high toxicity. Table 4-1 provides definitions for each category of toxicity.

Table 4-1. Categories of Conditions of Toxicity

Category	Conditions for Categorization
Non-toxic	No sample is ever toxic to any test species
Some Toxicity	At least one sample is toxic to one or more species, and all of the species' responses fall above their species-specific high toxicity threshold
Moderate Toxicity	At least one sample is toxic to one or more species, and at least one of the species' responses falls below their species-specific high toxicity threshold
High Toxicity	At least one sample is toxic to one or more species, and the mean response of the most sensitive species falls below its respective high toxicity threshold

The high toxicity threshold is determined for each species' biological endpoint from the entire data set summarized in the statewide report (Anderson et al., 2010). This threshold is the average of two numbers, both expressed as a percentage of the control performance. The first number is the data point for the 99th percentile of the Percent Minimum Significant Difference (PMSD). The second value is the data point for the 75th percentile of Organism Performance Distribution of all toxic samples, representing an organism's response on the more toxic end of the distribution. This average serves as a reasonable threshold for highly toxic samples.

Sample collection sites were generally located in lower watershed areas, such as tributary confluences or upstream and downstream of potential pollutant sources because these lower watershed sites drain larger areas with greater levels of human activity. A minority of the sites were selected probabilistically (i.e., at random). Therefore, these data primarily characterize the sites monitored, and cannot be used to make assumptions about unmonitored areas.

Additionally, samples were not evenly distributed throughout the regions. For example, over 400 samples were analyzed for the Central Valley Region, while only two samples were analyzed in the Santa Ana Region. Of all the regions with sufficient ambient toxicity data to be analyzed, the Central Coast Region had the largest percentage of samples showing high toxicity (28 percent). The rest of the regions that were analyzed ranged from 0 to 22 percent of samples showing high toxicity. The Santa Ana Region had the highest percentage of non-toxic samples at 100 percent. However, this was based on only two sites and a low number of samples.

Table 4-2. Toxicity Assessments of California Waters

Region	Years	Toxicity Test Methods	Chronic Toxicity Test Method	Water Tested	No. of sites	Results
San Francisco Bay (R2)	2001-2006	Acute: *C. dubia* *P. promelas*	*S. capricornutum*	Ambient freshwater	48	Non-toxic: 63% Some toxicity: 31% Moderate toxicity: 6% High toxicity: 0%
Central Coast (R3)	2001-2010	*C. dubia* *P. promelas* *C. variegatus* *A. affinis* *H. azteca* *T. pseudonana*	*S. capricornutum*	Ambient freshwater and saltwater	164	Non-toxic: 33% Some toxicity: 18% Moderate toxicity: 21% High toxicity: 28%
Los Angeles (R4)	2001-2009	*C. dubia* *P. promelas* *M. galloprovincialis*	*S. capricornutum*	Ambient freshwater and saltwater	127	Non-toxic: 85% Some toxicity: 9% Moderate toxicity: 2% High toxicity: 4%
Central Valley (R5)	2003-2007	*C. dubia* *P. promelas*	*S. capricornutum*	Ambient freshwater	436	Non-toxic: 49% Some toxicity: 33% Moderate toxicity: 17% High toxicity: 1%
Lahontan (R6)	2003-2004	*C. dubia* *P. promelas*	*L. minor*	Ambient freshwater	4	Non-toxic: 25% Some toxicity: 25% Moderate toxicity: 50% High toxicity: 0%
Colorado River Basin (R7)	2002-2008	*C. dubia* *P. promelas* *A. affinis* *H. azteca*	NA	Ambient freshwater	18	Non-toxic: 72% Some toxicity: 6% Moderate toxicity: 6% High toxicity: 16%

Region	Years	Toxicity Test Methods	Chronic Toxicity Test Method	Water Tested	No. of sites	Results
Santa Ana (R8)	2005	*C. dubia* *P. promelas*	NA	Ambient freshwater	2	Non-toxic: 100% Some toxicity: 0% Moderate toxicity: 0% High toxicity: 0%
San Diego (R9)	2002-2008	*C. dubia* *H. azteca*	*S. capricornutum*	Ambient freshwater	65	Non-toxic: 61% Some toxicity: 22% Moderate toxicity: 9% High toxicity: 8%

Of the 617 sites monitored for water toxicity in this assessment, 327 (53%) had at least one sample in which toxicity to at least one test species was observed. Of these, 65 (10.5% of the total) were classified as high toxicity sites, meaning that the average result for the most sensitive species in all samples at the site was more toxic than the high toxicity threshold for that species.

North Coast Region 1

An assessment of water column toxicity could not be made for the North Coast Region because very little quantitative information is available on most water bodies in this Region (Stillway 2012).

San Francisco Bay Region 2

In the San Francisco Bay Region, most samples were non-toxic or showed some toxicity. Sixty- three percent of the samples for the Ceriodaphnia dubia (water flea) tests were deemed non- toxic, 31 percent showed some toxicity, six percent were moderately toxic, and no samples were highly toxic. For Pimephales promelas (fathead minnow), 60 percent of the samples were non-toxic, 10 percent showed some toxicity, 17 percent were moderately toxic, and 14 percent displayed high toxicity. Finally, for Selenastrum capricornutum (freshwater algae), 26 percent were non-toxic, 47 percent showed some toxicity, four percent were moderately toxic, and 22 percent displayed high toxicity. Correlation analyses and toxicity identification evaluations showed that the majority of toxicity was caused by pesticides at sampling sites located in close proximity to agricultural and urban areas. Pyrethroids were identified as the primary cause of toxicity to C. dubia in agricultural areas, while urban areas showed organophosphate and pyrethroid contamination (Anderson et al. 2012a).

Central Coast Region 3

In the Central Coast Region, there was a relatively even spread across the four categories of toxicity. Thirty-three percent of the samples were non-toxic, 18 percent showed some toxicity, 21 percent were moderately toxic, and 28 percent were highly toxic. Water column toxicity was strongly related to the percentage of agricultural land but was not significantly related to percentage of urban land use. Toxicity identification evaluation (TIE) studies in the Central Coast Region have demonstrated that freshwater toxicity to C. dubia was caused primarily by the organophosphate pesticides chlorpyrifos and diazinon, while marine toxicity to Mytilus galloprovincialis (mussel) and Atherinops affinis (topsmelt) was attributed to mixtures of cationic metals (Anderson et al. 2012b).

Los Angeles Region 4

In the Los Angeles Region, most of the samples were non-toxic (85 percent). Nine percent showed some toxicity, two percent were moderately toxic, and four percent displayed high toxicity. While there were no significant associations between water column toxicity and land use, chemical analyses indicated that the organophosphate pesticides chlorpyrifos and diazinon were the primary cause of toxicity to C. dubia (Anderson et al. 2012c).

Central Valley Region 5

In the Central Valley Region, about half of the samples were non-toxic (49 percent). Thirty-three percent showed some toxicity, 17 percent were moderately toxic, and one percent showed high toxicity. Data was collected at a large number of less-developed sites, so comparisons of toxicity with land use had limited benefit. Correlation analyses and TIEs indicated that a combination of organophosphate and pyrethroid pesticides were the primary cause of toxicity to C. dubia (Markiewicz et al. 2012).

Lahontan Region 6

In the Lahontan Region, there were no high toxicity results. Twenty-five percent of the tests were non-toxic, another 25 percent showed some toxicity, and 50 percent were moderately toxic. Water column toxicity was elevated in agricultural, urban, and mixed agricultural-urban areas compared to the surrounding undeveloped land. Toxicity to *Limna minor* was attributed to the herbicide Transline®, while the cause of toxicity to *P. promelas* was inconclusive (Stillway et al. 2012b).

Colorado River Basin Region 7

In the Colorado River Basin Region, most test results were non-toxic (75 percent). Six percent showed some toxicity, another six percent were moderately toxic, and 16 percent displayed high toxicity. The minimal number of sites utilized in the land use analysis made it difficult to establish trends. However, it was determined that the survival of test organisms in freshwater samples from sites with greater than 10 percent urban use and less than 25 percent agricultural use was found to be significantly lower than survival rates at sites in other categories.

Correlation analyses and TIEs conducted between 1993 and 2008 have identified a wide range of contaminants, including organophosphate and pyrethroid pesticides, surfactants, and non- polar organic compounds (Anderson et al. 2012d).

Santa Ana Region 8

A very limited number of samples (only two) were analyzed for the Santa Ana Region. Neither of these samples showed any toxicity (Stillway 2012c).

San Diego Region 9

In the San Diego Region, most samples were non-toxic (61 percent). Twenty-two percent showed some toxicity, nine percent were moderately toxic, and eight percent displayed high toxicity. For the most part, sites in the San Diego Region were not toxic to C. dubia, but the few sites that were found to be toxic were located in areas with urban land use within one kilometer upstream. In contrast, algal toxicity was found at low to moderate levels throughout the San Diego Region, both in urban and in less-developed areas. A series of municipal storm water reports from 2004 to 2010 were reviewed to determine the cause of freshwater toxicity in the San Diego Region. These reports found organophosphate and pyrethroid pesticides to be the primary toxicants. Three studies examining storm water runoff were used to assess the cause of toxicity in marine waters. These studies found metal constituents, primarily cations of zinc and copper, to be the primary toxicants (Anderson et al. 2012e).

4.3 Bioregions of California

California contains a wide variety of bioregions, from desert environments below sea level, to coastal areas, to alpine areas of 14,000 feet or more in elevation. The diversity of geography in conjunction with variations in temperature and moisture leads to a significant diversity of biological resources. California has the highest total number of species and the highest number of endemic species within its borders as compared with any other state. California also has the highest number of rare species, typically listed under the federal and state Endangered Species Acts. About one-third of those species are at risk, meaning these species have the potential for local or global extinction.

California is divided geographically into bioregions (CBC 2008), classified by relatively large areas of land or water, which contain characteristic, geographically distinct assemblages of natural communities and species. The biodiversity of flora, fauna, and ecosystems that characterize a bioregion tend to be distinct from that of other bioregions. California is divided into 10 bioregions: Modoc, Klamath/North Coast, Sacramento Valley, Bay Area/Delta, Sierra, San Joaquin Valley, Central Coast, Mojave Desert, South Coast, and Colorado Desert. See Appendix C for detailed information on the bioregions of California.

5 ANALYSIS OF PROJECT OPTIONS

This chapter describes the major issues identified during the scoping and development process and provides a discussion of the State Water Board's rationale for the Provisions. The eleven identified major issues are:

- Issue A. What types of water quality objectives should be established for chronic and acute toxicity?
- Issue B. Should specific test methods amenable to the TST approach be required for determining compliance with NPDES permits and meeting water quality objectives and effluent limitations?
- Issue C. What statistical approach should be required?
- Issue D. Should species sensitivity screening be required?
- Issue E. Which procedure should be used for determining reasonable potential?
- Issue F. What water quality based effluent limitations should be used for toxicity in the State of California?
- Issue G. What monitoring frequencies should be established?
- Issue H. How should mixing zones and dilution credits be determined?
- Issue I. How should we determine when a toxicity reduction evaluation is required?
- Issue J. What should be required of storm water dischargers?
- Issue K. What should be required of nonpoint source dischargers?

As options are discussed for each issue, option 1 is the preferred and recommended option throughout this chapter.

To determine the current conditions for all issues evaluated in chapter 5, and the change that would result from adoption of the preferred option, State Water Board staff reviewed regional basin plan language and a representative sample of non-storm water NPDES permits (Appendix I). The representative sample of permits reviewed consisted of two or more non-storm water NPDES permits from each Regional Water Board that established typical permit requirements for chronic and acute toxicity requirements in non-storm water NPDES permits. Regional Water Board staff reviewed the list of permits selected and confirmed that the sample permits from their region were indeed representative of chronic and acute toxicity permit requirements within their region. In some cases, Regional Water Board staff recommended other permits be evaluated. All permits recommended by Regional Water Boards were also evaluated.

5.1 Water Quality Objectives

5.1.1 Issue A. What types of water quality objectives should be established for chronic and acute toxicity?

Current Conditions

Each Regional Water Board's basin plan contains narrative toxicity objectives that prohibit toxic substances in toxic amounts. The following objective from the San Diego Regional Water Board's basin plan is the most common example of the narrative objectives found in regional basin plans:

> "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.
>
> The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in U.S. EPA, State Water Resource Control Board, or other protocol authorized by the Regional Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay.
>
> In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged."

The San Francisco and Los Angeles Regional Water Boards also have acute toxicity water quality objectives in their basin plans. These acute toxicity water quality objectives are based on percent survival. The San Francisco Regional Water Board has the following acute toxicity water quality objective in their basin plan:

> "There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90%, or less than 70%, 10% of the time, of test organisms in a 96-hour static or continuous flow test."

An overview of the existing toxicity objectives is provided in Appendix D: Aquatic Toxicity Objectives Contained in Regional Board Basin Plans. Currently these objectives, along with the implementation requirements established in Section 4 of the SIP, provide the basis for regulating toxicity within NPDES permits, WDRs, and waivers of WDRs.

Currently, the State Water Board and Regional Water Board work together to assess compliance with narrative water quality objectives in basin plans for the purposes of 303(d) listing and 305(b) reporting. The Water Boards use data analyzed by laboratories using traditional t-tests, entered into CEDEN to create Lines of Evidence (LOE) for listing and de-listing waterbodies. Upon approval, the Regional Water Boards recommended 303(d) List is submitted to the State Water Board and compiled into a statewide 303(d) List. The statewide 303(d) List is subject to the approval of the State Water Board and the U.S. EPA.

Issue Description

Although the narrative toxicity objectives are mostly consistent across the regions, there is inconsistency in the translation of the narrative objectives to numeric levels used for determining reasonable potential and effluent limitations in NPDES permits and for evaluating whether or not the narrative water quality objective is met in the surface waters. Clear and specific numeric toxicity objectives are needed to help ensure consistent statewide protection of aquatic life.

Options

Option 1 - Preferred: Retain the narrative water quality objectives in basin plans and establish statewide numeric water quality objectives for chronic and acute toxicity in the form of a numeric null hypothesis and alternative hypothesis which relies on regulatory management decisions.

Retaining Narrative Objectives

The Provisions would establish statewide numeric water quality objectives for both chronic and acute aquatic toxicity. Under this option, except where a conflict exists, the Provisions would not supersede the narrative water quality objectives in the basin plans.

Retaining the narrative objectives in basin plans would allow Regional Water Boards to continue to use their narrative toxicity water quality objectives to assess and protect the quality of surface waters. Regional Water Boards would also be able to use their narrative water quality objectives to derive chemical-specific limits, targets, or thresholds to protect water quality. The Provisions would supersede basin plan provisions to the extent that they specify procedures of assessing compliance with any numeric or narrative toxicity water quality objective or specify aquatic toxicity testing and/or interpretation of toxicity data. An indication of the language that would be superseded by the Provisions is available in Appendix E.

Establishing Numeric Water Quality Objectives in the Form of a Null Hypothesis and Alternative Hypothesis

The numeric water quality objectives would be stated in the form of a null hypothesis expression paired with an alternative hypothesis expression, which would rely on a regulatory management decision (RMD). The RMD, as described in more detail below, represents the maximum allowable error rates and thresholds for toxicity that would result in an unacceptable risk to aquatic life. Attainment of the water quality objective is demonstrated by conducting toxicity testing, analyzing the data using the TST statistical approach, and rejecting the null hypothesis. The alternative hypothesis is accepted when the null hypothesis is rejected.

Statewide numeric water quality objectives for both chronic and acute toxicity would rely on a type of statistical hypothesis testing, called the TST. The TST is based on a type of hypothesis testing referred to as bioequivalence testing. The TST provides a direct approach to analyze whether the response of test organisms to ambient water is less than a predetermined proportion of the control response that is considered unacceptably toxic, and to analyze whether that difference is statistically significant. This option would work in conjunction with Option 1 of Issue C using the TST approach and Option 1 of Issue F for effluent limitations.

The chronic toxicity water quality objective would be the following null and alternative hypotheses:

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

In general terms, the null hypothesis would be the following statement: the ambient water is toxic because the response (e.g., survival, reproduction, growth) of the test organisms in the ambient water sample is less than or equal to 75 percent of the test organisms' response in the control water sample.

H_a: Mean response (ambient water) > 0.75 • mean response (control)

In general terms, the alternative hypothesis would be the following statement: the ambient water is not toxic because the response (e.g., survival, reproduction, growth) of the test organisms in the ambient water sample is greater than 75 percent of the test organisms' response in the control water sample.

The acute toxicity water quality objective would be the following null and alternative hypotheses:

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

In general terms, the null hypothesis would be the following statement: the ambient water is toxic because the response (e.g., survival) of the test organisms in the ambient water sample is less than or equal to 80 percent of the test organisms' response in the control water sample.

H_a: Mean response (ambient water) > 0.80 • mean response (control)

In general terms, the alternative hypothesis would be the following statement: the ambient water is not toxic because the response (e.g., survival) of the test organisms in the ambient water sample is greater than 80 percent of the test organisms' response in the control water sample.

Attainment of the water quality objective is demonstrated by conducting toxicity testing, analyzing the data using the TST statistical approach, and rejecting the null hypothesis. When the null hypothesis is rejected, the alternative hypothesis is accepted in its place, and there is no exceedance of the water quality objective. An exceedance of the water quality objective is demonstrated by failing to reject the null hypothesis.

To determine whether ambient water meets numeric water quality objectives, the "sample" would be undiluted ambient water that is a representative sample of the waterbody. Compliance with effluent limitations would be determined at the IWC using the most sensitive species, as described in Option 1 of Issue F (effluent limitations). The water quality objective applies to all ambient waters for inland surface waters, enclosed bays, and estuaries and coastal lagoons whether or not the water body or sample location is downstream from a discharge. Ambient water refers to a sample taken from the water body of concern that may or may not be influenced by a discharge.

Regulatory Management Decisions and Error Rates

The RMD represents the maximum allowable error rates and thresholds for toxicity that would result in an unacceptable risk to aquatic life. The difference between the effects of the test sample and the control will never be exactly zero, thus they will never be bioequivalent (Erickson and McDonald 1995). The RMD is set at a level that takes into consideration natural variation in test organisms' response. When using the TST approach, these RMDs are intended to identify unacceptable toxicity in WET tests when it occurs, while also minimizing the probability that the IWC is declared toxic when it is non-toxic.

The RMD for chronic toxicity test is set at 75 percent, or 0.75, which means that a 25 percent or more effect in the test sample is considered evidence of unacceptable chronic toxicity. The RMD for acute toxicity is set at 80 percent, or 0.80, which means a 20 percent or more effect in the test sample is consider evidence of unacceptable acute toxicity.

The selected RMDs for chronic and acute toxicity are consistent with the RMDs included in the peer reviewed U.S. EPA National Pollutant Discharge Elimination System Test of Significant Toxicity Technical Document (TST Technical Document) (U.S. EPA 2010b). Section 1.4 of the TST Technical Document provides a detailed discussion of how the RMD values were developed and tested during the development of the TST approach. Guidance taken from the U.S. EPA Technical Support Document for Water Quality-Based Toxics Control (Technical Support Document) in conjunction with peer reviewed literature was used to set appropriate RMD values. Using a 25 percent effect threshold as the RMD value is consistent with U.S. EPA's use of IC_{25} as an acceptable effect threshold for determining chronic toxicity. In addition, both the Technical Support Document and scientific literature supports the use of a 25 percent effect as a toxic threshold above which ecological effects are likely. The acute RMD value threshold of 20 percent effect is consistent with peer reviewed literature indicating that a greater than 20 percent mortality is likely to result in ecological effects. Furthermore, the State Water Board's external peer review process independently demonstrated support for the use of the RMDs in the Provisions.

All statistical hypothesis tests have some probability of making an error when accepting or rejecting the null hypothesis. An RMD is an explicit, transparent decision based on achieving desired rates for both Type I (i.e., alpha or α) and Type II (i.e., beta or β) errors. A Type I error (α) results when the null hypothesis is rejected but is in fact true. A Type II error (β) results when the null hypothesis is not rejected but is in fact false. Using the RMDs in the Provisions, both α and β are accounted for and error rates are minimized.

In the WET program, the bioequivalence value (b) is the fraction of the control response that is considered a threshold for toxicity. For chronic testing in EPA's WET program, the b values in the TST null hypothesis is set at 0.75, which means 25 percent effect (or more) is considered evidence of unacceptable toxicity. Effluent responses substantially less than 25 percent would be interpreted as a lower risk potential. For acute WET tests, the b value is set at 0.80, which means that a 20 percent effect (or more) is considered evidence of unacceptable toxicity.

The acute RMD toxicity level is higher than the chronic RMD toxicity level because of the severe environmental implications of acute toxicity, such as lethality or organism death (U.S. EPA 2010).

Organisms' responses in the test sample and in the control are unlikely to be exactly the same, even if no toxicity is present. They might differ by such a small amount that even if the difference in responses was statistically significant, it would be considered negligible biologically. Using the TST approach with an RMD acknowledges the fact that test organisms' response can be less than the control organisms' response and still be considered acceptable, and it accounts for variability in the organisms' response.

Table 5-1. Summary of regulatory management decisions (RMDs) identified in U.S Environmental Protection Agency's Test of Significant Toxicity for analyzing whole effluent toxicity (WET) and ambient toxicity data (Diamond et. al. 2011)

RMD	Acute toxicity endpoints	Chronic toxicity endpoints
"b" value	0.80	0.75
Effect level at and above which sample is declared toxic at least 75% of the time	20%	25%
Effect level at and below which a sample is declared not toxic at least 95% of the time	10%	10%

Difference Between Traditional Hypothesis Testing and the TST Approach

In hypothesis testing, the statistical approach is used to either “reject” or “fail to reject” the null hypothesis. When using the TST approach (Chapter 5.3.1 Issue C, Option 1), or restated hypothesis testing, the null hypothesis states, “the sample is toxic,” and attainment with the water quality objective is demonstrated by rejecting the null hypothesis. The alternative hypothesis is “the sample is not toxic.” In contrast, the null hypothesis (H_0) in traditional hypothesis testing generally states that there is no difference between the organisms’ response in the test water sample and the organisms’ response in the control water. In other words, the traditional null hypothesis is “the sample is not toxic.”

Using the TST, the null hypothesis is rephrased to ask if the mean response of the organisms in the test sample (e.g., ambient water) is less than a defined biological amount. The null hypothesis is stated to allow some percent difference from the control to be acceptable.

The Food and Drug Administration has successfully used this approach in bioequivalence testing for many years to evaluate drugs, as have many researchers in other biological fields. In addition, this approach has been used to evaluate required cleanup for superfund sites. This option directly incorporates statistical significance and biological importance through the use of the RMD.

This use of the TST approach would also define both the α and β error rates (U.S. EPA 2010b). Although the U.S. EPA test method manuals require an α of 5 percent (0.05), a level of β is not specified in traditional hypothesis testing (U.S. EPA 1995, 2002 a, b, c). The TST approach defines both the α and β error rates to further protect water quality. Defining both α and β provides greater confidence that truly non-toxic effluent samples are identified as non- toxic and truly toxic effluent samples are identified as toxic. Defining α also accounts for normal method variability; further ensuring that an effluent is correctly declared toxic or non-toxic.

Correctly identifying toxicity in effluent is often a critical first step in implementing control measures to protect beneficial uses in receiving waters.

Besides failing to specify β, the traditional hypothesis testing presents two other issues when analyzing data. The first issue is that this approach does not clearly define how much of a difference between the test organisms’ response and the control organisms’ response will result in rejecting the null hypothesis. A statistically significant difference may or may not be biologically significant. The second issue is that a traditional hypothesis approach provides no incentive to produce high quality data. Using a traditional hypothesis test, an exceedance of the water quality objective occurs only when the null hypothesis is rejected. The lower the quality of the test data, (i.e., data with high within-test variability), the more difficult it is to reject the null hypothesis. Thus, with a traditional hypothesis test, low quality data is less likely to detect toxicity and lead to an exceedance of the water quality objective. Using the TST approach, with a restated null hypothesis, an exceedance of the water quality objective occurs only when the null hypothesis cannot be rejected. Because higher quality data can help with rejecting the null hypothesis dischargers have an incentive to produce high quality data with low within-test variability.

Comparison of Current Conditions and the Preferred Option

Under the preferred option, the narrative aquatic toxicity water quality objectives in the Regional Water Board basin plans would be retained. In addition to these narrative objectives, statewide numeric water quality objectives for aquatic toxicity would be established. The Provisions would only supersede basin plan provisions to the extent that they specify procedures of assessing compliance with any numeric or narrative toxicity water quality objective or specify toxicity testing and/or interpretation of toxicity data.

Numeric water quality objectives for chronic and acute aquatic toxicity will provide a more consistent assessment of toxicity in ambient surface waters with greater confidence in the results because numeric water quality objectives provide clear RMDs for unacceptable toxicity, which unlike narrative objectives, are not subject to interpretation. In addition, because the numeric water quality objectives in the Provisions include null hypotheses which state that the effluent is toxic, discharges have an incentive to provide high quality data, with low within-test variability, to ensure that the null hypothesis can be rejected when the mean effect is below the RMD. Lower within-test variability will increase the confidence in the aquatic toxicity test results.

Clear numeric RMDs and an incentive to produce lower within-test variability would help achieve project goal number 1— to adopt consistent, statewide water quality objectives for acute and chronic toxicity that are protective of California’s water from both known and unknown toxicants.

For the purposes of 305(b) assessments and 303(d) listing analyses and determining whether a water body exceeds the numeric water quality objective, statistical analysis of the water quality objectives would now be done using the TST approach, as described in option 1 of Issue C. Analyzed data would continue to be uploaded to CEDEN, from which the State Water Board would develop Lines of Evidence (LOE). Regional Boards would continue to use LOEs and best professional judgement to assess compliance with narrative water quality objectives, as well as the numeric water quality objective.

In 2011, the State Water Board conducted a comparison of toxicity test data analyzed using the TST approach compared to other current statistical approaches. The TST Test Drive found that other current statistical approaches tended to declare toxicity tests with high within-test variability as non-toxic, even if the mean effect was high, some well above a 25 percent effect. The TST approach, on the other hand, declared tests non-toxic if they have low within-test variability, and if the mean effect was below the RMDs. The TST approach declared all tests with a mean effect above the RMD as toxic regardless of within-test variability. In addition, the TST approach declared some tests as toxic that had a mean effect below the RMD but also had high within-test variability. This is because high variability reduces a test’s power, or the confidence to reject the null. The analysis concluded that the results of both the TST approach and the current statistical approaches agree over 90 percent of the time, indicating that the use of the TST is not expected to change the number of exceedances over the current status. For those tests where the TST approach provided a different outcome than current statistical approaches, the TST approach appeared to perform better and provided a greater confidence in the outcome. Both the TST and other statistical approaches identified some tests as toxic that other approaches did not; therefore, even though the TST approach provides greater confidence in the toxicity assessment, the overall number of exceedances is not expected to increase using the TST approach compared to other current statistical approaches. Thus, the number of waterbodies determined to be impaired for toxicity is also likely to remain about the same using the TST approach or other current statistical approaches. However, assessment using numeric water quality objectives and the TST approach may identify toxicity in different waterbodies than other current statistical approaches. The TST Test Drive analysis is discussed further in Option 1 of Issue C.

Receiving water limitations are established in WDRs to ensure that a discharger does not cause or contribute to an exceedance of water quality objectives. Currently receiving water limitations for toxicity are typically narrative limitations stating the discharger shall not discharge toxic substances in toxic amounts. It is likely that the Regional Water Boards would include receiving water limitations in permits based on the numeric water quality objectives indicated in the Provisions. While a net increase in toxicity detections is not expected, it is possible that a discharger may be identified as exceeding the numeric toxicity receiving water limitation.

Advantages and Disadvantages

This option has the advantage of consistent statewide numeric toxicity water quality objectives which incorporate RMDs. Using the chronic and acute toxicity null hypotheses in conjunction with the TST approach, the Water Boards will be better able to define unacceptable levels of toxicity. This will lead to greater confidence in making a determination regarding the presence of toxicity.

Using RMDs, paired with the TST approach provides a clear, transparent way to determine if there is an exceedance of the numeric toxicity water quality objectives. The RMDs, paired with established α and β rates, provide a high level of confidence in the results from toxicity tests.

Using the TST approach which incorporates RMDs and both Type I and Type II error assure that when a test results in a fail, there is a high degree of certainty that the toxicity detected is biologically significant. Restating the null hypothesis requires dischargers to produce high quality results to reject the null hypothesis, as described in more detail in Option 1 of Issue C, thus assuring that when a test results in a pass, there is a high degree of confidence that the sample is not toxic.

***Option 2**:* Retain the narrative objectives in basin plans, and establish statewide numeric water quality objectives for chronic and acute toxicity based on an effect concentration

Under this option, the narrative objectives would not be superseded except to the extent of any conflict. The Provisions would establish a statewide numeric water quality objective for chronic toxicity based on either the NOEC or EC_{25}. The choice of using NOEC or EC_{25}

would depend on the statistical approach chosen as considered in Issue C. Regional Water Boards could continue to use their narrative toxicity water quality objectives to assess and protect the quality of surface waters. Regional Water Boards would also be able to use their narrative water quality objectives to derive chemical-specific limits, targets, or thresholds to protect water quality.

The NOEC is the highest concentration of ambient water or effluent in which no adverse effects are observed in the aquatic test organisms. The EC_{25} is a point estimate of the toxicant concentration that would cause an observable effect in 25 percent of the test organisms.

The NOEC and EC_{25} endpoints are applied as an effect at a certain concentration of either effluent or ambient water. Because water quality objectives are intended to protect beneficial uses in undiluted ambient waters, a water quality objective would therefore need be applied as 100 percent ambient water. If the NOEC is used for establishing a chronic numeric water quality objective the chronic toxicity water quality objective would be:

> The NOEC shall not be less than 100 percent ambient water.

If the EC_{25} is used for establishing a chronic water quality objective the chronic toxicity water quality objective would be:

> The EC_{25} shall not be less than 100 percent ambient water.

The California Ocean Plan expresses acute and chronic water quality objectives in acute toxicity units (TU_a) and chronic toxicity units (TU_c). These toxicity units are derived using either a NOEC, EC_{25}, or an LC_{50}. Under this option the acute and chronic water quality objectives could be expressed as 0.3 TU_a and 1.0 TU_c, as similarly expressed in the California Ocean Plan, and as recommended by U.S. EPA in the Technical Support Document.

The acute toxicity water quality objective could be based on a point estimate approach, such as an LC_{50}. An LC_{50} is the concentration of ambient water or effluent that would cause death in 50 percent of the test organisms. U. S. EPA has recommended an acute criterion maximum concentration of 0.3 TU_a (U.S. EPA 1991). The Technical Support Document defines acute toxicity units as $TU_a = 100/ LC_{50}$. This objective is compatible with high dilution waters and has been incorporated into the California Ocean Plan as an objective. However, this objective would not be protective of inland surface waters that have little or no dilution or mixing because an acute objective of 0.3 TUa is not achievable without dilution. An issue with using a point estimate to develop an acute water quality objective is that an objective relying on a lethal concentration or acute toxicity units has not been developed for waters with low dilution or no dilution available. Since California has several effluent dominated water bodies, an acute effluent limit would need to be developed that would be compatible with waters where no dilution or mixing is available. The Water Board would need to establish the protective level for acute toxicity by establishing a lethal concentration (LCx) of less than an LC_{50}, which could be used for an acute water quality objective.

The water quality objectives in this option would rely on either a NOEC statistical approach or a point estimate approach. These approaches are discussed in options two and three of Issue C. The advantages and disadvantages of these statistical approaches are discussed under those options.

Option 3: Supersede the narrative objectives in basin plans, and establish statewide narrative water quality objectives for chronic and acute toxicity

Under this option, statewide narrative water quality objectives for chronic and acute toxicity would be established. The statewide narrative water quality objectives would supersede chronic and acute narrative and numeric water quality objectives in the basin plans pertaining to aquatic toxicity. Attainment of the narrative water quality objectives would be demonstrated by conducting aquatic toxicity tests and analyzing the test data.

Under this option, the Provisions could allow permitting authorities to choose from a variety of statistical approaches, or the Provisions could specify a statewide statistical approach. The choice of statistical approach is discussed in Issue C.

Under this option, the Provisions could rely on the statewide narrative water quality objectives to derive maximum daily and median monthly effluent limitations. The choice of effluent limitations is discussed in Issue F.

Under this option the narrative toxicity water quality objectives would not be retained in the basin plans. Regional Water Boards could use the statewide narrative water quality objectives to derive chemical-specific limitations, targets, or thresholds to protect water quality for human health or aquatic life uses. An advantage of this option is that statewide narrative water quality objectives for aquatic toxicity would be applied to all U.S. EPA approved test methods, not just those listed in Table 1 of the Provisions.

Although the narrative toxicity objectives are mostly consistent across the regions, there is inconsistency in the translation of the narrative objectives to numeric levels used for evaluating whether or not the narrative water quality objective is met in surface waters. This option would not ensure consistent application of the statewide narrative water quality objectives. Therefore, a disadvantage of this option is that it would not meet project goal 1– to adopt consistent, statewide water quality objectives for acute and chronic toxicity that are protective of California's waters from both known and unknown toxicants. Narrative water quality objectives would not be applied consistently across the state, providing uneven levels of protection of aquatic life beneficial uses and regulatory uncertainty.

This option is also inconsistent with 40 CFR 131.11(b), which states that in adopting water quality criteria (which are known as water quality objectives in California), states and authorized tribes should adopt numeric criteria based on 1) Clean Water Act section 304(a) guidance, also known as recommended water quality criteria; or 2) 304(a) guidance modified to reflect site-specific conditions; or 3) other scientifically defensible methods. Furthermore, in establishing criteria, states should establish narrative criteria where numeric criteria cannot be established or to supplement numeric criteria. As described in option 1, numeric aquatic toxicity water quality objectives can be established.

Option 4: No Action

Under this option, the Water Boards would continue to use the water quality objectives for toxicity in each respective basin plan. However, despite the implementation measures established in the SIP, this approach has led to regulatory inconsistencies and potential impacts to aquatic life beneficial uses. This option would not meet project goal 1–to adopt consistent, statewide water quality objectives for acute and chronic toxicity that are protective of California's waters from both known and unknown toxicants. Narrative water quality objectives are not applied consistently across the state, providing uneven levels of protection of aquatic life beneficial uses and regulatory uncertainty. This option would also fail to meet project goals 2 and 3 as no program of implementation or a consistent flexible framework for monitoring would be adopted. Finally, this option would fail to meet project goal 4 as no statewide statistical approach would be adopted.

5.2 Aquatic Toxicity Test Methods

5.2.1 Issue B. Should specific test methods amenable to the TST approach be required for determining whether ambient water meets numeric water quality objectives and for assessing compliance with applicable permit terms?

Current Conditions

In aquatic toxicity tests, organisms of a particular species are held in test chambers and exposed to an aqueous-based sample (e.g., effluent, storm water, receiving water), and observations are made at predetermined exposure periods. At the end of the test, the responses of test organisms are used to estimate the effect of the sample.

Most basic aquatic toxicity tests expose organisms for varying periods ranging from acute 24-hour exposures measuring survival, to chronic 7-day exposures measuring survival, growth and reproduction. Water or sediment samples are divided into several replicate exposure chambers and tested simultaneously with a control consisting of laboratory water. Water samples can also be diluted into multiple concentrations to estimate the magnitude of toxicity present in the sample. Biological observations are recorded for each replicate both during and at the termination of the exposure. These replicate observations form the basis of the statistical analyses.

Generally, NPDES permits, including storm water permits, require use of the applicable test methods listed in 40 CFR part 136. Permit writers may include requirements for the use of toxicity test methods that are not identified in part 136 (e.g., the West Coast Methods) on a permit by permit basis. (40 CFR 122.41(j)(4) and122.44(i)(1)(iv)). A review of representative non-storm water NPDES permits from each of the regions found that generally all the permits reviewed use test methods and species amenable to the TST approach and acceptable for use according to the Provisions. Two of the permits reviewed for the discharge to saline waters required a shrimp species that are not included in Table 1 of the Provisions.

Laboratories that participate in the State Water Board's SWAMP program typically use methods in the U.S. EPA method manuals for toxicity testing. Other methods may be used for special studies, including using test species that are more sensitive to specific pesticides or chemicals.

Issue Description

There is no statewide consistency in the selection of a particular test method and the analysis of the toxicity testing data. A variety of statistical approaches can be used to analyze the biological responses (e.g. growth, reproduction) generated from the toxicity tests as discussed in Issue C. Any experimental design paired with an incompatible statistical approach could lead to the incorrect characterization of aquatic toxicity and the inability to compare toxicity impacts across the state. To provide clean and concise data analysis, and consistent use among all permit and across all programs, the U.S. EPA test methods selected for determining whether ambient water meets numeric water quality objectives and for assessing compliance with applicable NPDES permit terms effluent limitations should be amenable to the required statistical analysis.

Options

Option 1 – Preferred*:* Require U.S. EPA's established methods that are compatible with the TST

For determining whether ambient water meets numeric water quality objectives and for determining compliance with effluent limitations and applicable permit terms, the State Water Board would require the use of U.S. EPA-approved toxicity test methods that are amenable to the TST approach[5]. These U.S. EPA toxicity test methods are listed in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions, and are appropriate for use with the statistical approaches considered in Issue C, including the TST approach.

The list of test methods in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions would be used to measure toxicity. This list of test methods in the Provisions would supersede the list of recommended test methods listed in Section 4 of the SIP, which do not include test methods for acute toxicity. Additional guidance on toxicity test methods is

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[5] U.S. EPA Method Manuals for acute toxicity include; Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition (EPA-821-R-02-012). U.S. EPA Method Manuals for chronic toxicity include: Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition (EPA-821-R-02-013); 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); and 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).

found in the SWAMP's [*Measurement Quality Objectives for Acute Freshwater Toxicity Test Methods*] document (https://www.waterboards.ca.gov/water_issues/programs/swamp/swamp_iq/docs/acute_freshwater_tox_mqo_082218.pdf).

Using the test methods listed in the Provisions would ensure that all toxicity test methods compliance with applicable permit terms can be paired with a compatible statistical approach.

In addition to correct statistical paring, this option provides clear direction regarding when to use marine versus freshwater test methods and species. Consistent with Section III.B.2 (formerly Section IV.B.1.b) of the Provisions, and quoted from the U.S. EPA Technical Support Document for Water Quality-based Toxics Control (US EPA 1991) "…freshwater organisms [shall be] used when the receiving water salinity is less than 1,000 mg/L, and …marine organisms [shall be] used when the receiving water salinity equals or exceeds 1,000 mg/L." For coastal areas and estuaries where the salinity is subject to change, freshwater organisms shall be used for receiving water in which salinity is less than 1,000 mg/L at least 95 percent of the time. Marine organisms shall be used for receiving water in which salinity equals or exceeds 1,000 mg/L at least 95 percent of the time. The inclusion of a percent is to ensure estuarine and fluctuating environments are correctly classified as what they predominantly are, not what they appear as at the time of select sampling. The use of 95 percent is consistent with current regional board basin plans, the CTR, and the National Toxics Rule. The timeframe from which the data used to calculate the percentage of time a water body is classified as marine or fresh, will be left to Regional Board discretion. For waters with salinities between these two categories, or tidally influenced freshwater the water body classification will be left to Regional Water Board discretion. The Regional Water Boards also have discretion to require dischargers to use freshwater test methods for dischargers that discharge freshwater effluent into marine waters, or inland saline waters. For example, this may be applied to discharges to inland saline waters that are located far from the coast, or to discharges to coastal waters when testing with freshwater species is considered protective of freshwater aquatic life beneficial uses in the receiving water.

Comparison of Current Conditions and the Preferred Option

The Provisions do not add new test methods or test species or alter existing test methods. Rather, the Provisions restrict the test methods and species to those U.S. EPA-approved methods and species which are amenable to the TST approach for assessing compliance with the numeric water quality objectives specified in Section II.C (formerly Section III.B.2) of the Provisions, compliance with the numeric effluent limitations specified in Sections III.C.5 and III.C.6 (formerly Sections IV.B.2.e and IV.B.2.f) of the Provisions, and when targets for a TRE are met as specified in Section III.C.7 (formerly Section IV.B.2.g) of the Provisions. These U.S. EPA methods include 40 CFR part 136 test methods and other U.S. EPA-approved methods, such as West Coast Methods. This is anticipated to have little or no effect on ambient water assessment programs, nonpoint source dischargers, storm water dischargers, or non-storm water NPDES permitted dischargers. The

Provisions list test methods and species for each test that are amenable with the TST approach in Table 1. Most of these species are readily available for use by laboratories that conduct toxicity testing. Dischargers may continue to use other test methods and species for additional monitoring as described in Section III.C.4 (formerly Section IV.B.2.d) of the Provisions.

Advantages and Disadvantages

The advantage of using the U.S. EPA toxicity test methods as listed in the Provisions, is that it would ensure species selection and experimental design are paired with a prescribed statistical approach. The list of U.S. EPA toxicity test methods in the Provisions would provide consistent test data and results and interpretation of those results. The list would also provide the ability to compare toxicity data across multiple water bodies and regions throughout the state. Requiring the use of the species listed in the Provisions would not have a major impact on laboratories conducting aquatic toxicity testing as many laboratories already are accredited by the state's Environmental Laboratory Accreditation Program (ELAP) to conduct such procedures.

A disadvantage of requiring the U.S. EPA toxicity test methods in Table 1 of the Provisions is that it would be more restrictive in the selection of species and experimental design, since only test methods that are compatible with the TST approach could be used for assessing whether ambient water meets numeric water quality objectives or for assessing compliance with applicable permit terms. It should be noted, however, that this applies only to non-storm water NPDES dischargers and the Provisions do allow Regional Water Boards to utilize other test methods as necessary to ensure the protection of beneficial uses when the rationale is documented in the permit fact sheet, equivalent document or Water Code section 13383 order or Water Code section 13267 order.

In the future, there may be need to add toxicity test species to the list of Table 1 species (e.g., adding species that are more sensitive to existing or emerging constituents found in effluent or storm water discharges or better represent resident species). Therefore, test methods and species that are not currently included in Table 1 may be added to Table 1 through a future rulemaking, following the required public participation requirements. The provisions indicate that Table 1 consists of U.S. EPA approved test methods. Therefore, before any test method can be added to Table 1 of the Provisions it must have been approved by U.S. EPA. An alpha error rate must be determined in order for a test method and species to be amenable to the use of the TST.

A process to determine alpha error rates is outlined in the TST Technical Document (U.S. EPA 2010). If selecting a U.S. EPA-approved test method and species, an appropriate alpha error rate must be determined in order to enable the use of the TST statistical approach to analyze the data produced in the toxicity tests. Developing an alpha error rate can be conducted in one of two ways. One option is to extrapolate an existing alpha error rate using a test species with the same biological endpoint and a similar test design (number of organisms, replicates). Another option is to develop an alpha error rate that incorporates the appropriate RMD (0.75 for chronic, 0.80 for acute). In order to do this, it is necessary to first characterize typical achievable laboratory performance in terms of various percentiles of long-run control coefficient of variation (CV), run simulated WET tests using different alpha values, and then choose the lowest alpha value that still results in a beta error rate of less than or equal to 0.05 at a 10 percent mean effect level. Please refer to Section 2 of the TST Technical Document (U.S. EPA 2010) for further discussion of the technical process for developing an appropriate method-specific alpha error rate.

Once an alpha error rate is developed, all research and processes will be subject to State Water Board review and rulemaking to amend Table 1 in the Provisions.

***Option 2**: No Action*

The Water Boards would continue to determine the toxicity test methods on a case by case basis, selected from 40 CFR part 136, or other U.S. EPA method manuals (e.g., the West Coast Methods manual) to be used for determining compliance with NPDES permits and meeting the aquatic toxicity water quality objectives and the effluent limitations. An advantage of this option is the flexibility provided to the Water Boards. However, some methods and species may not be amenable to the TST approach for statistical analysis of test data. If the TST approach is used in conjunction with an incompatible species or test method this could lead to an incorrect characterization of aquatic toxicity.

5.3 Statistical Approaches

5.3.1 Issue *C. What statistical approach should be required?*

Current Conditions

A statistical approach is needed to determine whether an organism's response to test water demonstrates a statistically significant difference from the response to control water. The State Water Board has not established a policy or plan requiring a specific statistical approach for toxicity test data analyses. Selection of existing statistical approaches are at the discretion of the Regional Water Boards and vary on a permit-by-permit basis. Regional Water Boards use a variety of different approaches including the TST approach, traditional hypothesis testing approaches including NOEC, and the point estimate approach. The North Coast, Central Coast, Los Angeles, Colorado River and San Diego Regional Water Boards have required non-storm water NPDES dischargers to use the TST approach as permits are issued or renewed.

The San Francisco Bay Regional Water Board requires non-storm water NPDES dischargers to use a point estimate approach. Other statistical approaches include the NOEC and a *t*-test in conjunction with a traditional hypothesis approach.

The State Water Board's SWAMP uses traditional hypothesis testing to analyze ambient surface water toxicity test data for numerous projects.

However, SWAMP's Stream Pollution Monitoring Trends program (SPoT), has been using the TST statistical approach for its trend reports since 2012. The Irrigated Lands Regulatory Program (ILRP), the Central Coast, Los Angeles, Central Valley, Colorado River, and San Diego Regional Water Boards include toxicity testing as a requirement of their respective ILRP Monitoring and Reporting Programs (MRP), but do not prescribe any specific statistical approach.

Issue Description

A variety of statistical approaches, including hypothesis testing and point estimate approaches can be used to analyze the biological responses (such as survival, growth, reproduction) generated from the toxicity tests. Each approach has its own set of strengths and limitations as discussed below in the corresponding sections.

Some current statistical approaches require complex data interpretations to determine attainment of their respective toxicity objectives. Using a statewide statistical approach across the Water Boards would ensure an appropriate and consistent data analysis.

A statewide statistical approach must be able to be applied consistently across permits and programs including routine monitoring for NPDES permits, ILRP, and SWAMP so the data can be compared and used together for water quality assessment purposes such as the Integrated Report. To achieve the project goals, stated in Section 2.3 of the Staff Report the statistical approach must provide the following:

- Clear and direct interpretation of the aquatic toxicity water quality objectives
- Confidence in the test results through balanced error rates
- Clear and concise data analysis and data interpretation
- Consistent use among all permits and across all programs

Options

Option 1 – Preferred*:* Use the TST Statistical Approach

Under this option, dischargers would be required to use the TST approach to analyze aquatic toxicity test data to determine whether ambient water meets the numeric water quality objectives and whether discharger effluent complies with applicable permit terms. This option would work in conjunction with Option 1 of Issue A, for establishing chronic and acute toxicity water quality objectives and Option 1 of Issue F, for establishing numeric water quality based effluent limitations. To provide an improvement for the hypotheses testing based approach, the U.S. EPA developed the Test of Significant Toxicity (TST) approach to evaluate the biological data generated from toxicity tests. The TST statistical approach is based on a type of hypothesis testing referred to as bioequivalence testing. Bioequivalence is a statistical approach that has been used in evaluating clinical trials of pharmaceutical products (Anderson and Hauck 1983) and by the Food and Drug Administration (Hatch 1996; Aras 2001; Streiner 2003) and U.S. EPA programs (U.S. EPA 1988, 1989) and to evaluate effects of pesticides in experimental ponds (Stunkard 1990).

The TST approach is not a change to the WET test methods themselves, and laboratories would continue to use current U.S. EPA test methods when using the TST approach. The TST should not be confused with a toxicity test method as further elaborated in Section 2.6 of the Staff Report. The TST provides a more streamlined statistical approach, while increasing the incentive for dischargers to generate higher quality test data. The TST approach uses two-concentration data analysis where the instream waste concentration (IWC) is compared to a control concentration, to provide a clear and transparent pass/fail answer to the question, “Is the sample toxic?” This requires a yes or no answer, which is determined using a hypothesis test and does not rely on a dose response curve to answer this question. U.S. EPA has previously identified that a valid dose response curve is not needed to determine toxicity (U.S. EPA 2002d).

The TST approach accomplishes the project goals, as stated above, through improvements to traditional hypothesis tests. Three critical improvements are 1) the incorporation of regulatory management decisions (RMDs) with sets of individual test method-specific error values, 2) restating the null and alternative hypotheses so that dischargers are required to demonstrate that their effluent is not toxic, and 3) the incorporation of both false positive and false negative error rates, providing high confidence in the outcome for each result.

Regulatory Management Decisions (RMDs)

Toxicity is not an absolute quantity, but rather an effect that is determined relative to a control, when using a toxicity test. A hypothesis testing approach, such as the TST, incorporates what is considered acceptable or unacceptable toxicity as specific explicit levels of effect referred to as Regulatory Management Decisions (RMDs). The TST statistical approach implements what the RMD has defined as biologically important, by incorporating what effect level in the effluent or sample water is considered unacceptable toxicity.

For chronic toxicity, the RMD would be 0.75 (as consistent with the TST Technical Document, (U.S. EPA 2010b)) which means that a 25 percent (or more) toxic effect in ambient water or in effluent at the IWC is considered evidence of unacceptable chronic toxicity. Responses substantially less than a 25 percent toxic effect would not be considered toxic. The RMD for acute toxicity would be 0.80, which means that a 20 percent toxic effect (or more) at the IWC is considered evidence of unacceptable acute toxicity. The acute RMD toxicity threshold is lower (i.e., more strict) than that for chronic WET methods because of the severe environmental implications of acute toxicity (lethality or organism death). Biological organisms responses to the effluent and control are unlikely to be exactly the same, even if no toxicity is present. They might differ by such a small amount that even if statistically significant when using a standard t-test, the response would be considered negligible biologically. The RMD levels are set higher than those used in traditional t-tests to account for such negligible variation, which allows the TST approach to answer the question “Is the mean response in the effluent less than a defined amount?”

Restating the Null and Alternative Hypothesis

Using the TST approach, a sample would be considered to have an acceptable level of toxicity when the null hypothesis (H_0) is rejected. The null hypothesis for this approach is that the organisms' response in the effluent is less than or equal to a fixed fraction of the control response (e.g., 0.75 of the control mean response).

The TST approach is supported by a scientific body of evidence as demonstrated in the U.S. EPA external peer review; the Water Boards external peer review and the following peer reviewed journal articles: Denton et al. 2011, Diamond et al. 2011, Diamond 2013, Zheng 2013, Fox et al. 2019.

A statistical approach is used to either "reject" or "fail to reject" the null hypothesis. In order to conclude that the test sample is or is not toxic one must determine if there is a statistically significant difference between the control and test sample.

The TST uses a hypothesis testing approach but in a different way than traditional hypothesis testing. The TST hypothesis test restates the null and alternative hypotheses. The null hypothesis in the TST approach assumes that the test sample has an unacceptable level of toxicity until demonstrated otherwise (U.S. EPA 2010b).

Confidence and Error Rates

Due to the reversal of inequalities, under the TST, the Type I, or alpha value (α) is associated with false negative rates while the Type II, or beta value (β) is associated with false positive rates. Traditionally, the null hypothesis states there is no statistically significant difference between a sample treatment and a control. In traditional hypothesis testing the Type I error rate is generally referred to as a false positive, while the Type II error rate is generally referred to as a false negative. Under traditional hypothesis testing, regulatory programs primarily address the Type I error rate but not the Type II error rate. The Type II error rate is the error of accepting the null hypothesis ($H_{\varnothing}$) when it is in fact false and should be rejected. If the Type II error rate is not accounted for, a traditional hypothesis test would not consider how frequently it concludes there is no environmental effect when there in fact is one (i.e., the false negative rate would be unknown). The TST is advantageous as it addresses both the Type I and Type II errors rates (Table 5-2).

The hypothesis testing approach has four possible outcomes; (1) the IWC is truly toxic and is declared toxic, (2) the IWC is truly non-toxic and is declared non-toxic, (3) the IWC is truly toxic but is declared non-toxic, and (4) the IWC is truly non-toxic but is declared toxic. The latter two possible outcomes represent decision errors that occur with any hypothesis testing approach. In the NPDES WET Program, using the traditional hypothesis test, those two types of errors occur when, either test control replication is poor (i.e., the within-test variability is high) so that even large differences in organisms' response between the IWC and control are incorrectly classified as non-toxic (outcome [3] above) or, test control replication is very good (i.e., the within-test variability is low) so that a very small difference between the IWC and control are declared toxic (outcome [4] above). The former outcome stems from the fact that, the traditional hypothesis approach establishes and controls the Type I (α) error rate but not the Type II (β) error rate. Furthermore, establishing the Type II or beta error rate determines the power of the test (power is defined as 1-β), which is the probability of correctly detecting an actual toxic effect. A statistical approach with an increased statistical power has greater confidence in the outcome. Conversely, statistical approaches that lack statistical power have less confidence in the outcome.

One demonstrated benefit of the TST approach is that increasing the precision and power increases the chances of correctly rejecting the null hypothesis and declaring a sample non-toxic. The test power is increased by increasing the number of replicates and/or decreasing the within-test variability (U.S. EPA 2010b). Therefore, the TST increases the incentive for dischargers to generate higher quality test data.

Table 5-2. Summary of null hypotheses and Type I and Type II errors under the traditional hypothesis testing approach and the TST approach. *b* is equivalent to the RMD.

	Traditional	**TST**
Null Hypothesis (H_o)	$\text{Mean}_{\text{sample}} \geq \text{Mean}_{\text{control}}$ Sample has an acceptable level of toxicity (non-toxic)	$\text{Mean}_{\text{sample}} \leq b * \text{Mean}_{\text{control}}$ Sample has an unacceptable level of toxicity (toxic)
Type I (α) Rejecting when True	Set at 0.05 Sample is acceptable, but is declared unacceptable	Set at 0.05 – 0.25 Sample is unacceptable, but is declared acceptable.
Type II (β) Accepting when False	Not Established Sample is unacceptable, but is declared acceptable	Set at 0.05 Sample is acceptable, but is declared unacceptable

In response to stakeholder input from the November 2010 draft toxicity provisions, the State Water Board conducted a “test drive” to determine how results from toxicity test data analyzed with the TST compared to results from data analyzed using the traditional hypothesis testing approach. The *Effluent Stormwater and Ambient Toxicity Test Drive Analysis of the Test of Significant Toxicity (TST)* report (SWRCB 2011), referred to as the TST Test Drive, has been publicly available since 2011, and can currently be found on the Water Boards website at: https://www.waterboards.ca.gov/water_issues/programs/state_implementation_policy/docs/final_testdrive.pdf. Additionally, the results were published in Diamond et al. 2013, a peer reviewed scientific journal article.

Valid WET data were analyzed from 890 tests provided by more than 25 dischargers in California and Washington, representing the majority of test methods used in the WET program. An additional 3,201 freshwater chronic toxicity tests, obtained from ambient monitoring programs in California, were also analyzed.

The wastewater data set of 890 tests showed high concordance between results obtained by both the TST and the NOEC statistical approaches. The overall results of the TST Test Drive are similar comparing the two approaches, with the TST approach determining that 85.1 percent of all the tests reviewed were non-toxic, and the NOEC approach determining that 84.6 percent of all the tests reviewed were non-toxic. The results were further analyzed for just those tests with a mean effect at the IWC below the RMD, as depicted in Figure 5-1, and just those tests with a mean effect at the IWC that were equal to or above the RMD, as depicted in Figure 5-2 below.

For tests that had a mean effect at the IWC below the RMD of 25 percent for chronic methods and 20 percent for acute methods (Figure 5-1), the two approaches had similar results, agreeing that 91.8 percent of those tests should be declared non-toxic. The TST approach showed fewer (3.7 percent) of those tests to be toxic compared to the NOEC approach (5.5 percent). Tests declared toxic using the TST approach had a significantly larger effect and higher within-test coefficient of variation in both the control and the test sample than those tests declared toxic using the NOEC approach. Thus, the TST approach is more likely to declare tests as toxic if the effect size is large and/or within-test variability is large (Diamond et al. 2013). These results were consistent with other previous observations. For the TST approach, a relatively high within-test variability resulted in the inability to reject the null hypothesis that the effluent is toxic. Thus, the TST approach provides an incentive for dischargers to provide high quality test data with low within-test variability. The direct benefit and incentive of using good laboratory practices to minimize within-test variability and improve laboratory performance when using the TST approach is that those tests with low within-test variability and a median effect below the RMD are generally declared non-toxic. One way to increase the statistical power of the test is to add additional replicates at the control and the IWC. Data from the study suggest that, in many cases, adding additional replicates substantially improves test power, allowing a more confident decision about whether the null hypothesis should be rejected (Diamond et al. 2013). The TST Test Drive concluded that for most of the tests with a mean effect at the IWC below the RMD, that were declared toxic using the TST approach, the addition of a minimal number of replicates to the tests would have resulted in these tests being declared non-toxic.

The TST Test Drive further analyzed those tests that had a mean effect of 10 percent or less. The TST approach declared just 0.1 percent of those tests as toxic, while the NOEC approach declared 2.8 of those tests as toxic. These results highlight one of the problems with the use of the standard hypothesis approach in toxicity compliance assessment. As test power increases, a smaller difference in organisms' response between the sample and the control will be considered statistically significant. Thus, using a traditional hypothesis approach, as the test power increases there is a greater chance of declaring a sample toxic when the biological difference is in fact insignificant (Diamond et al. 2013).

For those tests that had a mean effect at the IWC at or above the RMD of 25 percent for chronic methods and 20 percent for acute methods (Figure 5-2), the two approaches also had a high degree of concordance, agreeing that 90.4 percent of those tests should be declared toxic. This means that the two approaches are both generally able to declare the test sample toxic when the magnitude of the effect is high. The NOEC approach declared 9.6 percent of these tests as non-toxic, while the TST approach declared all these tests as toxic. The results demonstrate another of the disadvantages of the NOEC approach, which is the lack of statistical power associated with effluent toxicity test methods. As a result, biologically significant levels of toxicity may be classified as non-toxic when using the NOEC approach (Diamond et al. 2013).

In the TST Test Drive, the NOEC approach declared some tests non-toxic with a mean effect at the IWC as high as 36 percent. Most likely these test results had greater with-in test variability and thereby lacked the statistical power to declare the results as statistically significant (Diamond et al. 2013).

The overall results from the TST Test Drive indicated the use of both the NOEC approach and the TST approach declared a similar percentage of tests as toxic and non-toxic. It also demonstrated that the TST approach is more likely to identify a sample as toxic when effects are substantial, above the RMD, and less likely to identify a sample as toxic when the effects are negligible, a median effect of 10 percent or less. In addition, for those tests with a mean effect below the RMD, tests having generally lower within-test variability and greater test power had a much lower percentage of tests declared toxic using the TST approach than when using the NOEC approach (Diamond et al. 2013).

The same comparisons of the TST approach to the traditional statistical approach were performed for the 3,201 freshwater chronic tests from ambient monitoring programs in California. This comparison yielded similar results to those for the 890 effluent tests. The TST approach declared 18.1 percent of all these tests as toxic, while the traditional approach declared 16.5 percent of all tests as toxic. As with the 890 effluent tests, the TST demonstrated a greater consistency in declaring tests that demonstrate substantial toxicity (a mean effect above the RMD) as toxic, and tests with negligible toxicity (a mean effect of 10 percent or less) as non-toxic.

Data Analysis and Interpretation

The TST approach streamlines and simplifies the data analysis process, as there is one statistical decision flowchart to be followed when analyzing all toxicity test results. Additionally, software which can be used to perform the TST analysis is readily available to laboratories throughout the state. A TST calculator, which can be used by dischargers and laboratories to assess toxicity test results is available on the Water Board’s toxicity page at: https://www.waterboards.ca.gov/water_issues/programs/state_implementation_policy/tx_ass_cntrl.html

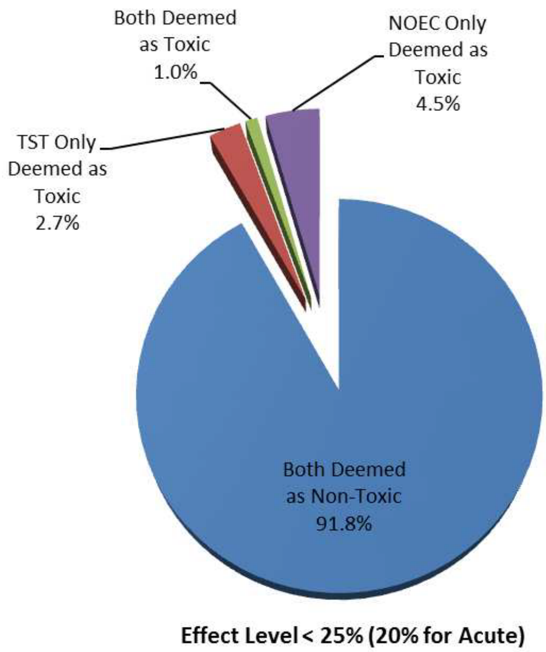


Figure 5-1. Summary of the tests from all methods that were declared toxic using TST and NOEC analysis with a mean effect at the IWC less than the toxic RMD of 25 percent for chronic or 20 percent for acute tests.

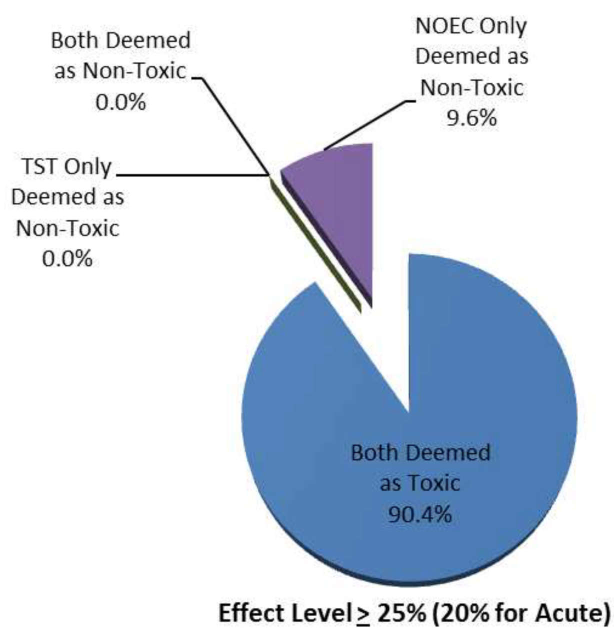


Figure 5-2. Summary of the tests from all methods that were declared non-toxic using TST and NOEC analysis with a mean effect at the IWC greater than or equal to the toxic RMD of 25 percent for chronic or 20 percent for acute tests.

Typically, using other statistical approaches, after the data analysis step there could be a need to conduct an additional data interpretation review (U.S. EPA 2000 and 2010a). However, with the TST approach, there is no need to review and make an assessment of within-test variability nor to review the concentration response curve, as required for the traditional hypothesis approach, or when using a point estimate approach. The TST clearly defines unacceptable toxicity (RMD) without a potentially subjective data interpretation review step, while the NOEC and point estimate approaches do not have a clearly defined level that is considered toxic, and therefore, makes data interpretation more complicated.

Comparison of Current Conditions and the Preferred Option

As discussed in the Current Conditions, many Regional Water Boards are currently incorporating the use of the TST statistical approach into permits. For example, a review of the California Integrated Water Quality System (CIWQS) shows roughly 20 percent of all active NPDES permits require the TST approach to analyze chronic toxicity data. Five of the nine Regional Water Boards have begun incorporating the TST approach into non-storm water NPDES permits upon issuance, reissuance, or renewal. For those programs and permits that are currently using the TST approach to analyze toxicity test data, the Provisions will require no change to the statistical approach.

Laboratories using a statistical approach other than the TST approach will need to begin using the TST approach to analyze both chronic and acute toxicity test data. Many laboratories already have and use TST analysis software. Software for using the TST approach is readily available to laboratories, and a TST calculator can be downloaded from the State Water Board’s website. Use of the TST approach also eliminates the need for review and assessment of both with-in test variability and the concentration curve, thus reducing the workload of laboratory staff.

As discussed above, the TST Test Drive demonstrated that use of the TST approach is not likely to result in a significant net increase or decrease in the number of exceedances compared to other statistical approaches for assessing toxicity data. The TST approach provides several advantages over a traditional hypothesis or point estimate approach. These advantages are discussed below. Most notably the TST approach greatly simplifies the assessment process and provides a clear pass/fail result. The Provisions would result in all programs and permits using the same statistical approach, the TST approach, to assess toxicity data. This will allow for simple comparison and assessment of discharges and ambient waters across the State.

Advantages and Disadvantages

The TST approach achieves goal 4 of the project as it (1) incorporates a statewide statistical approach that will provide a transparent determination of toxicity, (2) provides high confidence in those results, and (3) provides an incentive for dischargers to generate valid, high quality test data.

Requiring use of the TST approach statewide provides a consistent, uniform approach to be used across all permits and regulatory programs. Toxicity results from dischargers and waterbodies can be compared statewide and assessment of water body impairments will be simplified. These refinements simplify the toxicity data analyses and interpretation, while allowing for easy comparison of results from different dischargers. The TST approach provides clear pass/fail results that are easy to interpret and use to make a transparent determination of toxicity. The TST approach does not rely upon a dilution series or complicated, subjective data interpretation to determine if a test sample is toxic or non-toxic.

The TST approach provides high confidence in the test results as it incorporates both a false positive rate and a false negative rate. The false positive rate is the same as that used for the NOEC, of 5 percent. The false negative rate varies by test method and species but allows a reasonable assurance that tests that result in a pass are truly non-toxic. Having both the α and the β error rates incorporated into the statistical approach increases the test power which provides a high level of confidence in the outcome of each test and therefore provides greater protection of aquatic life.

The TST approach provides an incentive for dischargers to produce high quality data, as data with low within-test variability increases the confidence that correct determinations are made. The combination of false positive and false negative error rates, RMDs with clear pass/fail results, and an incentive for dischargers to produce high quality data, produces more confidence in the results than other statistical approaches used to assess toxicity test data.

Option 2*:* Use a no-observed-effect-concentration approach

The no-observed-concentration (NOEC) is the highest tested concentration of effluent or toxicant that has no adverse (not statistically significant) effect on test organisms, while the lowest-observed-effect-concentration (LOEC) is the lowest effluent concentration that produces an adverse statistically significant effect on test organisms. Determining the NOEC does not mean there was “no toxic effect,” only that an observed effect was not statistically significant from the control test at a given concentration. The LOEC is by default determined when the NOEC is generated. However, as this option utilizes the NOEC, it will only be referred to as the NOEC. Results can be reported as chronic or acute “toxicity units” (denoted as TUc and TUa respectively) that are calculated by dividing 100 by the NOEC.

Under this option, dischargers would be required to use a traditional hypothesis testing approach, which analyzes test results using the NOEC. This option would work in conjunction with Option 2 of Issue A and Option 2 of Issue F related to chronic and acute toxicity water quality objectives and effluent limitations.

Interpretation of the Aquatic Toxicity Water Quality Objectives

The NOEC is a well-established hypothesis testing analysis for determining if there is a statistical difference between the effects from the test water compared to a control. However, the NOEC requires a dilution series in the laboratory and review of a concentration response curve, often with complex data interpretation. The NOEC does not clearly define an effect level that is determined to be unacceptable toxicity (e.g. an RMD), and, therefore, is not easily understood and interpreted to determine compliance with permit terms.

Confidence and Error Rates

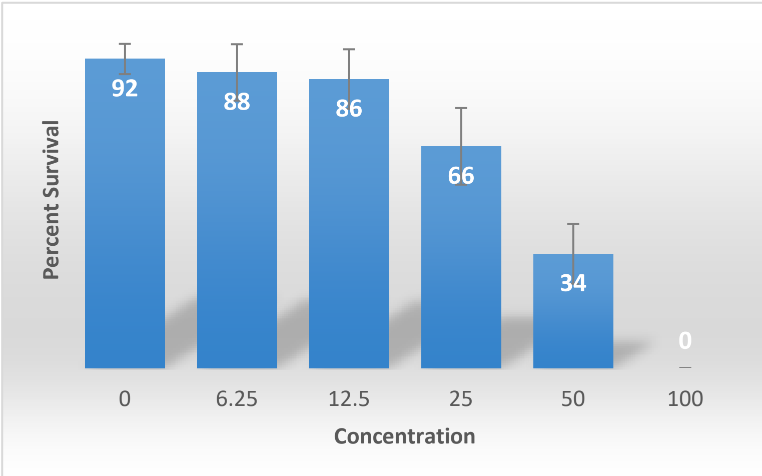
While the NOEC approach is well established, it comes with some drawbacks. Most noteworthy, the NOEC approach fails to incorporate a false negative rate (Type II error rate). Although the U.S. EPA test method manuals (U.S. EPA 1995; 2002a, b, c) require a false positive rate (Type I error rate) of 5 percent (0.05), a false negative level (denoted as β) is not specified in the traditional statistical approach, and the associated power of the test (1-β) is not taken into consideration. Power is the probability of correctly detecting a true toxic effect, such as declaring an effluent toxic, when, in fact, it is toxic. If the false negative rate is not specified, toxicity in a sample may not be accounted for, especially when there is high within-test variability. There would be little incentives for a testing laboratory to produce precise test results, and reduce within-test variability.

Data Analysis and Interpretation

The NOEC approach involves a complex data interpretation process which allows for potentially subjective bias. Data interpretation includes review and interpretation of a concentration response curve and involves within-test variability components such as the percent minimum significant difference (PMSD). Additionally, NOEC analysis does not provide a direct incentive for good laboratory practices to reduce within-test variability, nor does the approach provide consistency both among dischargers and statewide programs. Many researchers have warned that use of NOEC reflects a poor application of environmental statistics (Chapman et al.1996, Landis and Chapman 2011). Additionally, the models used for NOEC are subjective in choosing a prior distribution and mathematical methods for transforming data. Landis and Chapman 2011 conclude "[NOEC]s and [LOEC]s should be recognized as extremely poor tools to use as the basis for data interpretation and decision making. After all, [NOEC]s and [LOEC]s are not measurements with an associated standard error or deviation. They are not data, nor are they direct observations, but are simple labels for experimental treatments."

This option does not meet the project goals to incorporate a statewide statistical approach to analyze test results that will provide a transparent determination of toxicity with high confidence in those results, and provide an incentive for dischargers to generate valid, high quality test data.

Figure 5-3. Example dose response from multiple concentration exposure. NOEC is 12.5% and LOEC is 25%.



Option 3: Use a Point Estimate Approach

Under this option, dischargers would be required to use a point estimate approach to assess whether ambient water meets the numeric water quality objectives and whether discharger effluent complies with applicable permit terms. This option would work in conjunction with Option 2 of Issue A and Option 2 of Issue F for establishing chronic and acute toxicity water quality objectives.

Interpretation of the Aquatic Toxicity Water Quality Objectives

Point estimation approaches (i.e., LC_{50}[6]) are used to determine the concentration (expressed in form of percent effluent) that would cause an observable adverse effect in a given percentage of organisms. A point estimate is used to characterize the concentration of effluent that elicits a given biological response (such as decreased number of young and/or reduced survival).

Typically, the most common statistics include median lethal concentration (LC_{50}) for acute methods and a 25 percent effect or inhibition concentration (EC_{25} or IC_{25}) for chronic methods. The LC_{50} is a point estimate of toxicant concentration that would cause mortality to 50 percent of the test organisms (Figure 5-4), while EC_{25} and IC_{25} are the concentration that would cause an observable adverse effect in 25 percent of the test organisms.

The toxicity testing manuals describe the statistical flowcharts, and a few point estimate models such as Probit and Linear Interpolation to generate EC_{25} values (U.S. EPA 2002a, 2002b). For LC_{50}s, the manuals also include Spearman Kraber and graphical. In the

[6] LC50 is the concentration of effluent that causes 50 percent of the test organisms to die. It is calculated based on the does response curve and does not necessarily correspond to one of the sample concentrations tested.

literature, there are a variety of point estimate models that have been proposed for estimating the concentration for which there is a biologically significant effect (Environment Canada 2005; Noe et al. 2010 and others); however only some of these are used in regulatory programs.

Statistical Confidence

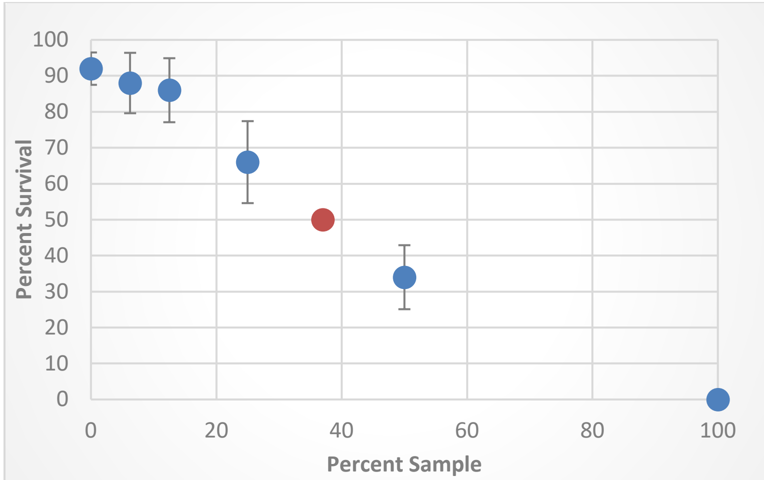
As with all statistical approaches, some error is associated with calculating a statistical mean, or in this case a point estimate value. Many statistical approaches use confidence intervals to provide a reasonable level of confidence in the outcome. The U.S. EPA toxicity test manuals state: “It should be noted that software used to calculate point estimates occasionally may not provide associated 95 percent confidence intervals” (U.S. EPA 2002c). A confidence interval is needed to know the reliability of the calculated point estimate value. Because the methods manuals don’t require the inclusion of confidence intervals and state permits do not require the additional calculation of confidence intervals, there is no statistical confidence and reliability in the calculated point estimate value. However, under this option, point estimate models could be developed which incorporate confidence intervals which would include statistical confidence in the outcome. This would be time consuming, costly and require additional peer review.

Data Analysis and Interpretation

Point estimation requires modeling expertise and specialized training as bias may easily be introduced during interpolations through the selection of dilution series, ill-fitting models, data smoothing, or improper transformation techniques. These limitations may ultimately affect the confidence level and therefore the reliability of the decisions based on point estimate approaches. Most point estimate endpoints are derived from a mathematical model that assumes a continuous concentration-response relationship, or a monotonic response. In other words, as the concentration of effluent increases the toxic effect increases proportionally. When using the U.S. EPA statistical model “linear interpolation” with a non-monotonic response (i.e., interrupted dose response), data would need to be smoothed (e.g. modified to capture patterns in the data) to apply the point estimation model. This has been criticized for under-coverage by the confidence interval and statistical bias, especially for *C. dubia* reproduction statistical endpoint (Fox et al. 2013). These models are complex and often difficult to use and interpret.

In addition, like the NOEC approach, point estimation relies on a dilution series and a concentration response curve, all of which add time to review.

Figure 5-4. Example of concentration response data with LC50 depicted as a red point.



This approach utilizes a more complex data analysis process, meaning there are multiple steps within a statistical decision flowchart to be followed for analyzing all test results. Typically, after the data analysis step a data interpretation review step would be required, such as the concentration response review. These steps can lead to different subjective interpretation depending on the complexity of the data.

Option 4: No Action

Under this option, the Water Boards would continue to determine the statistical approaches that will be used for toxicity evaluations. As each region currently uses a different approach (see current conditions, 5.3.1), some will have programs that clearly define RMDs, some will reward high quality data, and some will provide for clear data analysis, however not all programs will do so. Discrepancies among the Water Boards would persist. If Regional Water Boards continue to use U.S. EPA's NOEC or point estimate approaches the false negative rates will remain unknown and will fail to be incorporated into the statistical approach.

Continuing to use a variety of statistical approaches could make it difficult to provide adequate training, as each Regional Water Board would continue to implement their own statistical approach. Providing training for each possible statistical approach would increase costs.

Because laboratory test results from different Regional Water Boards may be analyzed using different statistical approaches, comparison of toxicity data for statewide assessments under 303(d) or other programs may be difficult or impossible.

This option would not require any changes to existing permits and therefore would not create additional work for Regional Boards. Although this option offers the advantage of flexibility to the Regional Water Boards, such discrepancies could lead to inadequate protection of aquatic life in receiving waters.

5.4 Implementation for Non-Storm Water NPDES Dischargers

To determine the current conditions for all issues addressed in Section 5.4 (5.4.1-5.4.6) of the Staff Report, State Water Board staff reviewed a representative sample of non-storm Water NPDES permits. To create the representative sample of non-storm water NPDES permits, a minimum of two permits were chosen from each region, which State Water Board staff felt were characteristic of non-storm water NPDES permits within each region. The list of permits selected was sent to Regional Water Board staff to review and confirm that the sample permits from their region are representative of the non-storm water NPDES permits within their region. Regional Water Board staff either confirmed the selected non-storm water NPDES permits were representative of Regional Water Board permit conditions and the procedures used to establish permit conditions to address acute and chronic toxicity in non-storm water NPDES permits, or selected other non-storm water NPDES permits that should be used, because they are more representative of non-storm water NPDES permits issued by that Regional Water Board. All permits recommended by Regional Water Boards were included in the representative sample.

5.4.1 Issue D. Should species sensitivity screening be required?

Current Conditions

Species sensitivity screening is a procedure that identifies or confirms the most sensitive or most appropriate test species for aquatic toxicity monitoring use. A statewide consistent procedure for conducting species sensitivity screening has not been established. Section 4 of the SIP and the *Technical Support Document* (U.S. EPA, 1991) contain some direction to Regional Water Boards for conducting species sensitivity screening, and Regional Water Board basin plans also provide additional direction.

Section 4 of the SIP contains the following direction for conducting species sensitivity screening: “At least three test species with approved test protocols shall be used to measure compliance with the toxicity objective. If possible, the test species shall include a vertebrate, an invertebrate, and an aquatic plant. After a screening period, monitoring may be reduced to the most sensitive species.”

Currently, six out of the nine Regional Water Boards refer to the use of the most sensitive species for routine monitoring in their basin plans. The North Coast, San Francisco Bay, and Los Angeles Regional Water Boards have some language that specifies which species to use in either an acute or a chronic screening process. The San Francisco Regional Water Board also includes the following language, “[t]hus far, no one test species has consistently been the most sensitive to all discharges. This strongly supports the current approach of requiring screening using several test species.”

The Central Coast, Colorado River, and San Diego Regional Water Boards have the following language in their respective basin plans: “Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board." The "analyses of species diversity" language seems to be the most detailed language provided to guide their species sensitivity screening procedures.

A review of representative non-storm water NPDES permits from each of the regions found that species sensitivity screening is conducted in a variety of ways. Some permits state that dischargers must use the species demonstrating the highest percent effect for the most sensitive species. Other permits indicate that dischargers must use the species demonstrating the lowest No Observable Effect Concentration (NOEC) and/or Inhibition Concentration of 25% (IC_{25}) value from previous monitoring events as the most sensitive species. In some cases, the permit states that the selection of the most sensitive species was up to the discretion of the Executive Officer. Some permits rely on multi-species testing for routine chronic or acute toxicity tests, rather than a single species determined through species sensitivity screening.

Permits require the use of either three species tests (one vertebrate, one invertebrate, and one plant), a combination of two species, or a single most sensitive species. For fresh water discharges, species selected were limited to fathead minnows (*Pimephales promelas*), water flea (*Ceriodaphnia dubia*) or green alga (*Selenastrum capricornutum* also named *Raphidocelis subcapitata*). Freshwater selection for acute toxicity also included rainbow trout (*Oncorhynchus mykiss*). For salt water discharges, species selected included mussel (*Mytilus galloprovincialis*), topsmelt (*Atherinops affinis*), giant kelp (*Macrocystis pyrifera*), sea urchin (*Strongylocentrotus purpuratus*), mysid shrimp (*Americamysis bahia*), red abalone (*Haliotis rufescens*), and the sand dollar (*Dendraster excentricus*).

Issue Description

Contaminants in discharges may be more toxic to some aquatic species than to others, depending on the type and nature of the particular contaminant. Typically, aquatic toxicity monitoring focuses on three major categories of species: vertebrates, invertebrates, and plants or algae. There are a variety of aquatic species and aquatic habitats throughout the state, which generally support life represented by these categories. Species in each of these categories have varying degrees of responses to toxic pollutants based on various toxicological properties of the pollutant. Toxicological properties of a pollutant include quantity, potency, bioavailability of the toxicant, and its effects on an aquatic species.

A species sensitivity screening is an analysis to determine the single most sensitive species from an array of test organisms. The most sensitive species is then used in routine and compliance monitoring. Determining the most sensitive species will in turn protect other species present in the state's waterbodies that are more resistant to the same toxic effluent.

Selection of the most sensitive species is an important component in detecting toxicants in effluent or a receiving water body. For example, if an effluent tends to contain pollutants that strongly affect invertebrates, using an algae or fish species for routine aquatic toxicity testing would not be as protective as using an invertebrate test species. It is also important to consider the presence of sensitive species in the receiving waters that might be a critical part of a healthy biological food web.

Options

Option 1 - Preferred: Require species sensitivity screening and the use of the most sensitive species for routine and compliance toxicity monitoring

Under this option, the Provisions would establish a consistent statewide procedure for species sensitivity screening and the use of the most sensitive species for toxicity testing. Species sensitivity screening procedures would specify the types of species that would be required for a species sensitivity screening, and how a single test species should be selected from a list of acceptable species for chronic and acute toxicity testing. The Provisions would also establish when the species sensitivity screening must be done and how often species sensitivity screening needs to be conducted. In this option, the Water Boards have discretion to choose how the most sensitive species is selected. However, the Water Board shall select the species exhibiting the highest percent effect at the IWC as the approach for selecting the most sensitive species, unless the Water Board identifies the basis for selecting a different approach.

Specifying the procedures, types of species, and the frequency for species sensitivity screening contributes to the goal of creating a consistent, yet flexible framework for monitoring toxicity and laboratory analysis.

The species sensitivity screening for chronic toxicity would require up to four sets of tests conducted within one year. Each set of tests would consist of, at a minimum, one invertebrate, one vertebrate, and one aquatic plant or algae. Appropriate species for each category would be selected by the Regional Water Boards from Table 1 of the Provisions.

The Water Boards may require a non-storm water NPDES discharger to conduct a species sensitivity screening for acute toxicity; however, it is not required. The species sensitivity screening for acute toxicity would also require up to four sets of tests conducted within one year, but each set of tests would consist of, at a minimum, one invertebrate and one vertebrate. For acute toxicity testing, the plant/algae species are not included because it is difficult to measure a plant/algae for acute biological endpoints, such as mortality. Appropriate species for each category would be selected by the Regional Water Boards from Table 1 of the Provisions.

For both acute and chronic toxicity, the results from the screening tests (TST "pass" or "fail" result and percent effect for each test) would need to be reported to the Regional Water Board.

Each type of species (vertebrate, invertebrate, and plant/algae) is necessary for the species sensitivity screening to account for all possible toxic constituents and to determine the most sensitive species to these constituents. In some cases, the vertebrate may be more resilient than the invertebrate, or vice versa. Therefore, the species that is the most sensitive would be identified through the species sensitivity screening.

Continuous dischargers would be required to conduct one set of testing per quarter, over four consecutive quarters. Non-continuous dischargers would be required to conduct one set of species sensitivity screening tests during each quarter in which there is expected to be at least 15 days of discharge to a surface water, with a minimum of two sets of tests in a year. Dischargers that are expected to have at least 15 days of discharge to a surface water in all four quarters of the calendar year would be required to conduct four sets of tests. Dischargers that are only expected to have 15 days of discharge to a surface water in three quarters of a calendar year would be required to conduct three sets of tests. Dischargers that are only expected to have 15 days of discharge to a surface water in one or two quarters of a calendar year would be required to conduct two sets of tests. Dischargers that only discharge to a surface water in one quarter would be required to conduct the required two sets of tests within that same quarter. The sets of species sensitivity screening tests must be evenly distributed across the period of discharge, to the extent feasible. For dischargers that are not expected to have at least 15 days of discharge in any quarter, the Water Boards would have discretion to require a species sensitivity screening, and to specify the required number of sets of tests that need to be conducted for that screening. If a species sensitivity screening is not required, the Water Boards would specify the most sensitive species.

Spreading species sensitivity screening over the entire calendar year or season of discharge ensures that the process accounts for variations in the types and amounts of toxicants that may be introduced into an effluent. For POTW dischargers, the characteristics of the influent may change over the course of the year depending on the use of different products such as cleansers, pet shampoos, pharmaceuticals, and other consumer products. Changes in temperature and rainfall may impact biological or industrial processes which could influence the type of toxicants in an effluent. Therefore, a species sensitivity screening across the calendar year or season of discharge accounts for a range of environmental and biological conditions.

For dischargers granted a dilution credit or mixing zone, the Water Boards could direct that a higher concentration of effluent than the IWC be used for a species sensitivity screening to increase the likelihood that potential effects might be observed. If the species sensitivity screening is run with very dilute effluent, the percent effect might be small for all species tested, which could make it difficult to determine which species is the most sensitive to the effluent. When a discharger is granted dilution, running the screening at a higher concentration of effluent would provide a greater likelihood that some effects may be observed, providing more robust results and greater confidence in the results of the screening. Species sensitivity screening conducted using a higher concentration than the IWC specified in a discharger’s NPDES permit would not be used to assess compliance with the MMEL or MDEL in the Toxicity Provisions.

For non-continuous dischargers that are seasonal or intermittent dischargers, species sensitivity screening tests for either chronic or acute toxicity could be conducted using effluent that is not discharged into surface waters. The effluent would need to be representative of the effluent that will be discharged to surface waters. One example of effluent not discharged into surface water that may be used for species sensitivity screening is effluent discharged onto land because of a prohibition on discharge into surface water during the summer season.

The Water Boards would have the discretion to choose how the most sensitive species is selected. The Water Boards would document how the most sensitive species is selected. The Water Boards should, in most cases, select the species exhibiting the highest percent effect at the IWC as the most sensitive species. However, the Regional Water Boards would have the discretion to specify a species that does not exhibit the highest percent effect at the IWC as the most sensitive species if the Water Board identifies the basis for selecting a different approach.

The Regional Water Boards may specify in the NPDES permit that the Executive Officer or Executive Director, as applicable, may allow temporary use of the next appropriate species as the most sensitive species when the discharger submits documentation and the Executive Officer or Executive Director determines that the discharger has encountered unresolvable test interference or cannot secure a reliable supply of test organisms.

The next appropriate species is a species in Table 1 of the Toxicity Provisions in the same test method classification (e.g., chronic aquatic toxicity test methods, acute aquatic toxicity test methods), in the same salinity classification (e.g., freshwater or marine), and is in the same taxon as the most sensitive species. For example, if the most sensitive species for the chronic marine methods is topsmelt (*Atherinops affinis*) and topsmelt is temporarily unobtainable, the next appropriate species would likely be inland silverside (*Menidia beryllina*) because it is the only other vertebrate species for chronic marine methods in Table 1. When there are no other species in Table 1 in the same taxon as the most sensitive species, then the next appropriate species is the species exhibiting the highest percent effect at the IWC tested in the species sensitivity screening other than the most sensitive species. For example, if the most sensitive species, for chronic marine methods, is giant kelp (*Macrocystis pyrifera*) and giant kelp is temporarily unobtainable, the next appropriate species would be the species exhibiting the highest percent effect at the IWC tested in the species sensitivity screening other than giant kelp. This would be either an invertebrate or a vertebrate species, because there are no other plant/algae species for chronic marine methods in Table 1. Use of the next appropriate species as the most sensitive species should be on a temporary basis. Once a test interference has been resolved or a reliable supply of the original most sensitive species test organisms can be secured, the discharger would be required to return to using the original most sensitive species.

The Water Boards would specify the most sensitive species and IWC in NPDES permits. When the species sensitivity screening is conducted within 18 months after the permit is issued, then the Regional Water Board will specify the most sensitive species in the permit until the species sensitivity screening is completed. The permit must also contain language indicating that either the Regional Water Board or the Executive Officer or Executive Director may determine the most sensitive species based on the results of the species sensitivity tests. The selection of the most sensitive species would be required to be documented in the NPDES fact sheet or an equivalent document.

After the effective date of the Provisions, all non-storm water NPDES dischargers, including all POTW dischargers, would be required to conduct a species sensitivity screening for chronic toxicity either prior to, or within 18 months after the first issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the permit. However, the Regional Water Board may allow a discharger to use test data generated within ten years prior to the first issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the permit after the effective date of the Provisions, provided that the species sensitivity screening is representative of the effluent, and either: (1) was conducted in accordance with Section III.C.2.c (formerly Section IV.B.2.b.iii) of the Provisions, or (2) the Regional Water Board accepts the use of the data in the screening, the data were analyzed using the TST, and the screening was conducted using at least one vertebrate, one invertebrate and one aquatic plant/algae from Table 1 of the Provisions.

Regional Water Boards would have the discretion to require non-storm water NPDES dischargers to conduct a species sensitivity screening for chronic toxicity prior to every subsequent issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the permit However, following the first permit issuance that occurs after the effective date of the Provisions, the Water Boards may allow non-storm water NPDES discharges to forgo a species sensitivity screening if the discharger has conducted a species sensitivity screening in accordance with Section III.C.2 (formerly Section IV.B.2.b) within 15 years of the issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) for that permit and the nature of the effluent has not changed since the last species sensitivity screening was conducted. The nature of the effluent may have changed due to modifications in the treatment process at the facility, an increase or significant decrease in the volume of waste water being treated at a facility, or changes to the source of waste coming into a treatment facility, such as the addition of a major industrial source of wastewater.

The Regional Water Board would have the discretion to require non-storm water NPDES dischargers to conduct a species sensitivity screening for acute toxicity prior to every issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the permit. If there have been any significant changes to the facility or the discharge since the last species sensitivity screening was conducted, a species sensitivity screening should be required prior to the next permit reissuance. In making this determination, the Regional Water Board would need to document the justification in an NPDES fact sheet or an equivalent document.

Comparison of Current Conditions and the Preferred Option

The species sensitivity screening requirements in the Provisions are consistent with species sensitivity screening requirements in the SIP and in the current basin plans that include guidance or direction on species sensitivity screening. The requirements in the Provisions are generally consistent with the selection of the most sensitive species in many of the reviewed non-storm water NPDES permits. The most sensitive species in the permits that were reviewed were either those species showing the largest effect at the

IWC, the species showing a significant effect at the lowest concentration of effluent, or a species selected by the Regional Water Board's Executive Officer. All species selected for toxicity testing in permits reviewed are included in Table 1 of the Provisions. If there are permits which include most sensitive species that are not in Table 1 of the Provisions, the most sensitive species in the permit would need to be changed to include a species from Table 1 when the permit is renewed.

The Provisions allow discretion by the Regional Water Boards to choose the appropriate approach for selecting the most sensitive species from the species sensitivity screening, but the Provisions state that the species exhibiting the highest percent effect at the IWC should generally be selected as the most sensitive species. This is consistent with the permits that use species sensitivity screening to choose a most sensitive species.

Some of the permits that were reviewed require the discharger to test three species rather than a single most sensitive species. For these permits, the Provisions will cause a reduction in the number of species that must be used for routine monitoring. This will result in a reduction in the use of laboratory resources and in an associated cost savings for these dischargers. The use of a reliable procedure to establish a single most sensitive species for the purpose of toxicity testing can provide a sufficient level of protection, while avoiding the increased economic and logistical burden associated with the use of multiple test species.

Neither the basin plans nor the permits provide prescriptive procedures or direction on conducting species sensitivity screening tests. In contrast, the Provisions provide clear directions on the number of tests needed for species sensitivity screening, the number of species to be used, and the timing for species sensitivity screening tests. The Provisions may require dischargers to increase the number of chronic and/or acute toxicity tests they conduct as part of the species sensitivity screening. However, since the Provisions require species sensitivity screening typically only once every 5 to 15 years, this requirement is not anticipated to have a significant impact on non-storm water NPDES dischargers.

Advantages and Disadvantages

The advantages of this option are that it would provide clear direction for when a species sensitivity screening is required and establish minimum requirements for conducting species sensitivity screening. Requiring dischargers to use species from Table 1 of the Provisions, which are amenable to the TST approach, ensures that the most sensitive species is one that can be properly analyzed with the TST and used for compliance with the effluent limitations. This option will provide flexibility to Regional Water Boards in determining the most appropriate sensitive species a discharger must use.

Selecting a most sensitive species would eliminate the need to test two or three different species during each instance of routine monitoring, reducing the use of laboratory resources and the associated costs.

A disadvantage of species sensitivity screening is that it does introduce some probability that the species selected will not be the most sensitive species for all possible toxicants in a discharger's effluent throughout the year or throughout the permit term. While following procedures for species sensitivity screening does help ensure the most appropriate sensitive species is selected, there is still a possibility that another species may be more sensitive to certain contaminants in a discharge, especially if the nature of the discharge changes throughout the year, or over time. This is in contrast to using two or three species to test for chronic or acute toxicity for each sample, which may provide a greater degree of protection from all possible toxicants, but at a greater cost to dischargers. However, if the species selected is the most sensitive to toxicants in the effluent, then the additional species do not add additional protection. Conducting a species sensitivity screening each time the permit is renewed or reopened to address toxicity requirements will help assure that any changes to the nature of the discharge over time are considered when selecting a most sensitive species and that a sufficient level of protection is achieved without the need to test multiple species. Although requiring testing using multiple species could provide a greater degree of protection against aquatic toxicity, using a single, most sensitive species does provide assurance that the Provisions adequately protect against toxicity while balancing cost and regulatory burden.

Option 2: Require the use of two or three species for chronic or acute toxicity tests

Under this option, a statewide requirement for a species sensitivity screening would not be established for non-storm water NPDES dischargers. Instead, non-storm water NPDES dischargers would be required to use three species for chronic aquatic toxicity, and two species for all acute aquatic toxicity tests. These species would include one vertebrate, one invertebrate, and one plant (or algae) species for chronic toxicity tests and one vertebrate and one invertebrate species for acute toxicity tests. The species selected in each category would be at the discretion of the Regional Water Boards. Appropriate species for each category would be selected from Table 1 of the Provisions.

This option would have an advantage of eliminating the need for species sensitivity screening. This option would also ensure a high level of protection of aquatic life and beneficial uses since the use of three species would cover a wider range of possible toxicants for each test.

A disadvantage of this option would be the increase in cost to dischargers due to the requirement of using three species for each chronic and two species for each acute routine and compliance monitoring test. Where the most sensitive species can be identified, the required use of other species for each aquatic toxicity test would likely be unnecessary, as the most sensitive species would be adequate to identify any exceedances of the toxicity objectives or violations of the effluent limitations.

Option 3: No Action.

The Regional Water Board would continue to choose how to conduct a species sensitivity screening, based on language in the SIP, their basin plan, and the Technical Support Document. This option would allow the greatest amount of Regional Water Board discretion in developing and implementing species sensitivity screening. However, this would continue to lead to inconsistencies between the Water Boards on how a species sensitivity screening is conducted and how often it is required for the dischargers by the Water Boards. Without a requirement to conduct the species sensitivity screening at a minimum frequency, species may be selected for testing that are no longer reflective of effluent and site-specific conditions, as well as changes in toxicants and species sensitivity. Since the species sensitivity screening requirements and procedures contained in the basin plans are not very prescriptive, the species sensitivity requirements and procedures for individual dischargers may vary, even within the same region. This option would fail to meet program goal number two, to adopt a program of implementation to control toxicity in discharges and achieve and maintain the toxicity water quality objectives in California waters.

5.4.2 Issue E. Which procedure should be used for determining reasonable potential?

Current Conditions

Regional Water Boards conducting reasonable potential analysis must follow 40 CFR 122.44(d)(1) to determine whether a discharge will, “cause, have the reasonable potential to cause, or contribute to” an excursion of a numeric or a narrative water quality objective.

Specifically, 40 CFR 122.44(d)(1) (ii) requires that,

> “When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water.”

There are no statewide procedures for conducting a reasonable potential analysis for aquatic toxicity in inland surface water and enclosed bays and estuaries. Although there are procedures in the SIP for conducting a reasonable potential analysis for priority pollutants, these procedures are not applicable to aquatic toxicity. There are also procedures described in the California Ocean Plan (State Water Resources Control Board, 2005a), but that plan applies to ocean waters.

The Technical Support Document contains two possible procedures for determining if a discharge has reasonable potential to cause or contribute to an excursion above an applicable narrative or numeric water quality objective. The first procedure is for making an assessment after effluent data has been generated; the second is an assessment would be made without effluent data considering non-facility specific information, similar types of facilities or chemicals used in Chapter 3 Technical Support Document. A detailed description of the procedures for reasonable potential analysis are included in the Technical Support Document sections 3.2 and 3.3.

Additionally, a possible reasonable potential analysis approach using the TST is described in Appendix E of the TST Implementation Document (U.S. EPA 2010a).

Six of the Regional Water Board basin plans do not contain procedures for reasonable potential analysis. The basin plans from the North Coast and Central Valley Regional Water Boards refer to 40 CFR § 122.44(d)(1)(ii) for their procedures in determining whether a discharge has reasonable potential. The San Francisco and Central Valley Regional Water Boards have similar language in their basin plans. The Central Valley Regional Water Board's basin plan states the following:

> "A discharger must demonstrate to the satisfaction of the [Regional] Water Board that particular substances do not cause, or have the reasonable potential to cause or contribute to an excursion above numerical and narrative objectives. Where multiple toxic pollutants exist together in water, the potential for toxicologic interactions exists. On a case by case basis, the Regional Water Board will evaluate available receiving water and effluent data to determine whether there is a reasonable potential for interactive toxicity."

A review of representative non-storm water NPDES permits from each of the regions shows a variety of approaches are used by Regional Boards to determine reasonable potential for aquatic toxicity. Examples of current approaches used to determine reasonable potential include:

1) Consideration of the nature of the effluent, the flow, and the complexity of the discharge to determine if a discharge has a reasonable potential to cause or contribute to toxicity in the receiving water. Potential toxicants used by facilities based on high permitted discharge rates and the materials used are also considered. After considering these factors, best professional judgement is relied upon to make this assessment.

2) A consideration of the results of the chemical-specific reasonable potential analysis conducted for the permit, including the potential toxic impact of the discharge, supplemented when necessary with other relevant information.

3) Consideration of any exceedances of any acute or chronic toxic effluent limitation in the current permit term or during a previous permit term.

Although these examples are representative of current conditions, not all permits clearly state the method used to determine reasonable potential for chronic or acute WET tests. In some permit fact sheets, the reasonable potential analysis for chronic and acute toxicity and the inclusion or lack of monitoring requirements and/or effluent limitations is not clearly explained.

Issue Description

There is no consistent procedure for reasonable potential analysis on a statewide level for addressing aquatic toxicity. Designation of new reasonable potential analysis procedures that are both consistent and simple to use would greatly aid the Regional Water Boards during permit writing and implementation (U.S. EPA 2014a). The U.S. EPA Permit Quality Review also noted a lack of toxicity data being used in California when conducting a reasonable potential analysis for aquatic toxicity (U.S. EPA 2014a). Toxicity data is useful when determining if a water body or effluent may have reasonable potential, because such data allows for assessment of the water body's current conditions. As toxicity data considers the cumulative and synergistic effects of all toxicants on test organisms, such data can be used directly to evaluate the overall potential impact of the effluent on the biological integrity of the aquatic community in the receiving water.

Options

Option 1 - Preferred: Require reasonable potential analysis using the U.S. EPA recommended procedures from the TST Implementation Document for certain non-storm water NPDES dischargers.

Under this option, reasonable potential analysis would be conducted using data generated within five years prior to the permit's issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements), using a minimum of four tests analyzed using the TST approach. The Water Boards would have discretion to use additional information.

This option would set a new state-wide requirement in which reasonable potential analysis for the numeric chronic toxicity objective is not required for POTW dischargers that are authorized to discharge at a rate equal to or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020). For these dischargers, routine monitoring and effluent limitations would be required.

Data to be Evaluated in a Reasonable Potential Analysis

Except for POTW dischargers that are authorized to discharge at a rate equal to or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020), the Water Boards would need to conduct a reasonable potential analysis, according to the procedures outlined in the Provisions, for non-storm water NPDES dischargers prior to every permit issuance, reissuance, renewal or reopening (if the permit reopening is to address toxicity requirements).

The reasonable potential analysis would incorporate all toxicity test data, that is representative of the effluent quality during the discharge conditions, which was generated within five years prior to permit issuance, reissuance, or reopening (if the permit reopening is to address toxicity requirements). All relevant information generated during those five years would be used to conduct a reasonable potential analysis. One example of when some data may not represent discharge conditions is when a facility has a major facility upgrade within the previous five years, such as upgrading from secondary to tertiary treatment. When such a change in facility operations occurs, the Regional Water Board may determine that data generated prior to the facility upgrade is not representative of effluent quality during current or planned discharge conditions and may elect to not use those data when conducting a reasonable potential analysis.

The Provisions would require data from a minimum of four tests conducted at the IWC within the previous five years to be analyzed using the TST approach. If the IWC in the new permit will be different from the IWC in the previous permit, toxicity tests conducted at the IWC for the new permit would be analyzed for purposes of determining reasonable potential. For example, if the IWC in the previous permit was 25 percent effluent and the IWC in the new permit is 50 percent effluent, the reasonable potential analysis would be conducted using toxicity tests conducted at 50 percent effluent.

When the data from the evaluated aquatic toxicity tests were not conducted at the IWC, then the Water Board shall either require the discharger to reanalyze the toxicity test data conducted at a higher concentration of effluent than the IWC using the TST, if that higher concentration was tested, or require the discharger to conduct a minimum of four aquatic toxicity tests at the IWC using a species from Table 1 of the Provisions and analyzed using the TST.

When the evaluated data is not from a minimum of four aquatic toxicity tests, then the Water Board shall require the discharger to conduct a minimum of four aquatic toxicity tests at the IWC using a species from Table 1 of the Provisions and analyzed using the TST. The Regional Water Board would be responsible for selecting the species that would be used in conducting these additional toxicity tests for reasonable potential analysis. Species would need to be selected from Table 1 in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions and the data would need to be analyzed using the TST approach. The Water Boards could also evaluate older toxicity test data to determine reasonable potential. This procedure is consistent with 40 Code of Federal Regulations part 122.44(d)(1)(ii).

If a non-storm water NPDES discharger does not have any effluent discharge prior to permit issuance, or if the effluent discharge prior to permit issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) is not representative of the quality of the proposed discharge, then the Regional Water Board may use non-facility specific monitoring data and other relevant information to make a reasonable potential determination, consistent with 40 Code of Federal Regulations part 122.44(d)(1)(ii).

Other relevant information which could be used when making a reasonable potential determination includes the nature of the effluent, such as potential toxicants in the effluent or influent, chemicals handled or produced by the facility, industrial processes, and processes used to purify or disinfect the effluent prior to release. Relevant information could also include fish die off observations, lack of available dilution, water quality and beneficial uses of the receiving water, existing data on toxic pollutants, analysis of toxicity test data at a concentration other than the IWC, and potential impact resulting from the location of the discharge, such as the presence or absence of threatened or endangered species and critical habitat at or near the discharge point(s) which could be negatively impacted by the incorporation of effluent in the receiving waters.

Procedures for Determining Reasonable Potential

Consistent with the TST implementation document, there are four possible outcomes in conducting a reasonable potential analysis:

- If any chronic or acute aquatic toxicity test at the IWC, analyzed using the TST approach, results in a fail, then the discharge has a reasonable potential to cause or contribute to an excursion above the toxicity water quality objectives.
- If any chronic or acute aquatic toxicity test at the IWC, exhibits greater than a 10 percent mean effect, as compared to the mean control response, then the discharge has a reasonable potential to cause or contribute to an excursion above the toxicity water quality objectives.
- If all chronic or acute aquatic toxicity tests at the IWC, analyzed using the TST approach, result in a “pass” and no test has a mean percent effect of greater than 10 percent, as compared to the mean control response, then the toxicity test data does not indicate reasonable potential to cause or contribute to an excursion above the toxicity water quality objectives. However, other relevant information may still be used by the Regional Board to consider if reasonable potential exists.
- If a discharge does not have at least four chronic or acute aquatic toxicity tests at the IWC, analyzed using the TST approach, there is not enough information to determine reasonable potential. Additional testing needs to be conducted at the IWC and/or analyzed using the TST approach. Alternatively, aquatic toxicity test data at a higher concentration of effluent than the IWC could be used to assess reasonable potential.

If a reasonable potential analysis indicates there is reasonable potential for either chronic or acute toxicity, then the Water Board would be required to include effluent limitations for toxicity in the discharger’s NPDES permit. Furthermore, the Water Boards may use other information or data to determine if the discharge has reasonable potential. Other information or data may include, but is not limited to, fish die off observations, data using a different concentration than the IWC, lack of available dilution, water quality and beneficial uses of the receiving water, the presence of endangered or threatened species or critical habitat, or existing data on toxic pollutants associated with the discharge.

If reasonable potential analysis indicates there is no reasonable potential, the Regional Water Board may, at its discretion, include a reopener clause in the NPDES permit. The reopener clause would allow the Regional Water Board to reopen the permit and reevaluate the discharger’s reasonable potential if and when new data or information becomes available that indicates the facility may, in fact, have a reasonable potential to cause or contribute to an excursion above the toxicity water quality objectives.

Applicability of Reasonable Potential Analysis Requirements

Under this option all POTWs that are authorized to discharge at a rate equal to or greater than five million gallons per day (MGD) and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) would be required to conduct routine chronic toxicity monitoring and meet the chronic toxicity effluent limitation in the NPDES permit. As a result, no chronic toxicity reasonable potential analysis would be required for those dischargers.

California has legal authority to implement provisions of the Clean Water Act. States are not precluded from omitting or modifying any provisions of the Clean Water Act to impose more stringent requirements. (40 CFR 123.25(a).). The Toxicity Provisions would create new requirements that would require the Water Boards to include chronic toxicity monitoring and chronic toxicity effluent limitations in the NPDES permit for all POTW dischargers that are authorized to discharge at a rate equal to or greater than five MGD and are required to have a pretreatment program. The Provisions do not include a determination or an assumption that POTW dischargers that are authorized to discharge at a rate equal to or greater than five MGD and are required to have a pretreatment program have reasonable potential. Instead, a reasonable potential analysis would not be required for these dischargers before a Water Board included effluent limitations for toxicity in a permit.

Federal regulations require POTW dischargers that have a total design flow greater than 5 MGD and that receive pollutants from industrial users that may pass through or interfere with the operations of the POTW to establish a pretreatment program. This federal regulation also allows Regional Water Boards to require POTW dischargers with a design flow of less than 5 MGD to develop a pretreatment program if circumstances warrant a pretreatment program to prevent interference with the POTW or pass through (40 CFR § 403.8(a)).

Chronic toxicity reasonable potential analysis is not required for any POTW discharger that is authorized to discharge at a rate equal to or greater than 5 MGD and is required to have a pretreatment program, as such dischargers generally receive voluminous influent from a variety of sources that may include municipal and/or industrial discharges. Since toxicants may enter the influent from a variety of sources, the types, nature, and quality of possible toxicants contained in the influent of larger POTWs are less likely to be fully understood. This influent may contain pollutants that interact with plant operations affecting the quality of the effluent, including pesticides (U.S. EPA, 2011a). These pollutants may also pass through a POTW's removal and filtration process into the effluent. In addition, because a variety of potential sources of toxicity exists for POTWs that are authorized to discharge at a rate equal or greater than 5 MGD and are required to have a pretreatment program, differing pollutants, from more than one source, may interact creating a higher risk of toxicity that can affect plant operations and effluent quality. The threshold of 5 MGD and required pretreatment program was selected as the appropriate threshold for always requiring routine monitoring and effluent limitations for chronic toxicity. This threshold is consistent with the threshold used by U.S. EPA in requiring POTWs to have pretreatment programs for similar reasons as mentioned above. Any pollutants that are discharged in the effluent from these types of facilities may adversely impact aquatic life beneficial uses in receiving water. Routine monitoring for chronic toxicity would alert dischargers to toxic events, and effluent limitations would in turn provide a higher level of ecological protection.

All other non-storm water NPDES dischargers must conduct reasonable potential analysis for chronic toxicity prior to every permit issuance, reissuance, or reopening (if the permit reopening is to address toxicity requirements). This includes POTW dischargers that are authorized to discharge at a rate of less than 5 MGD and also includes POTW dischargers that are authorized to discharge at a rate equal or greater than 5 MGD but are not required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020).

For acute toxicity, all non-storm water NPDES dischargers are not required to conduct acute toxicity reasonable potential analysis unless specified by the Regional Water Board. Depending on the nature of the influent, the dilution, and the treatment processes associated with a non-storm water NPDES discharge, a chronic toxicity test is generally protective of both chronic and acute toxicity. In each non-storm water NPDES discharger's NPDES fact sheet (or equivalent document) the Regional Water Board would be required to document the basis for the decision whether to conduct a reasonable potential analysis for acute toxicity. The situations that may warrant a reasonable potential analysis for acute aquatic toxicity include, but are not limited to, discharges to water bodies inhabited by threatened and endangered species (if a chronic toxicity test surrogate is not available), discharges with high dilution rates (as high dilutions may mask chronic effects), or a situation in which the chronic toxicity test is not adequately protective of aquatic life beneficial uses (such as a pesticide that may be present in the discharge, to which acute toxicity test species are more sensitive than chronic toxicity test species). For example, the Regional Water Board could use the thresholds described in the Technical Support Document to help determine when an acute toxicity reasonable potential analysis is needed. The Technical Support Document uses a dilution of 350 to 1 as a threshold for determining reasonable potential—at a dilution of less than 100 to 1 chronic methods are used, at a dilution between 101 and 349 to 1 use either chronic, acute or both methods, and at a dilution greater than 350 to 1 use acute methods. The California Ocean Plan (SWRCB 2000a) also includes similar language and thresholds.

Comparison of Current Conditions and the Preferred Option

Currently, there are no consistent statewide procedures for determining when and how to conduct reasonable potential analysis. The Provisions would establish such clear and consistent statewide procedures for determining when and how to conduct reasonable potential analysis for both acute and chronic toxicity. These requirements include specific procedures for determining acute and chronic toxicity and require all POTW dischargers that are permitted to discharge at a rate equal or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) to conduct chronic toxicity monitoring regardless of reasonable potential. All Regional Water Boards would be required to use the U.S. EPA's recommend procedures from the TST implementation document for establishing a reasonable potential for acute and chronic toxicity.

The 10 percent threshold in the Provisions does not allow for a subjective interpretation regarding the potential to cause or contribute to toxicity. The requirements may initially create a small increase in work to analyze the previous five years of toxicity test data and potentially reanalyze some tests using the TST approach, upon permit issuance, reissuance, or renewal.

However, the requirement will afford the long-term benefit of more comprehensive and consistent protection of water quality.

The requirements in the Provisions which specify that POTW dischargers that are authorized to discharge at a rate equal or greater than 5 MGD and are required to have a pretreatment program must conduct routine chronic toxicity testing will likely result in an increase in the number of facilities that are required to conduct routine chronic toxicity monitoring. The review of a representative sample of permits revealed that most of the permits for POTW dischargers of this size already require the dischargers to conduct routine chronic toxicity monitoring.

Because this option provides clear thresholds for establishing when a reasonable potential exists and requires that the Regional Water Boards use all toxicity test data generated within five years prior to permit issuance, reissuance, renewal, or reopening to evaluate if the discharger has exceeded those thresholds for establishing reasonable potential, the option will likely lead to an increase in the number of non-storm water NPDES dischargers that are required to conduct routine monitoring for chronic and/or acute toxicity and comply with toxicity effluent limitations.

The option would continue to allow the Regional Water Boards to determine reasonable potential based on other factors, such as the nature and type of discharge or chemicals used by a facility that may potentially cause toxicity, fish die off observations, data using a different concentration than the IWC, lack of available dilution, water quality and beneficial uses of the receiving water, the presence of endangered or threatened species or critical habitat. Therefore, it is likely that where a discharge has been determined to have reasonable potential to cause or contribute to an exceedance of a narrative toxicity water quality objective, that discharge will also be determined to have reasonable potential to cause or contribute to an exceedance of the numeric toxicity water quality objective.

Advantages and Disadvantages

This option has the advantage of providing a clear procedure for analyzing and determining when a non-storm water NPDES discharger has reasonable potential to cause or contribute to an excursion above the toxicity water quality objectives. The determination would be consistent with the TST approach and the recommendations in Appendix E of U.S. EPA's TST Implementation document (U.S. EPA, June 2010). Dischargers that do not have toxicity test data from at least four tests, using species selected by the Regional Water Board from Table 1 of the Provisions, which were generated within five years prior to permit issuance, reissuance, or reopening (if the permit reopening is to address toxicity requirements) the discharger would be required to conduct additional toxicity tests so that a minimum of four tests could be analyzed using the TST approach, therefore, assuring that sufficient data is available to Regional Water Boards to make an assessment. This option still provides flexibility to Regional Water Boards to use other relevant information for determining reasonable potential and older data for analyzing reasonable potential. This option would lead to greater statewide consistency in making reasonable potential findings.

This option also imposes more stringent requirements than the Clean Water Act by not requiring a reasonable potential analysis and requiring the Water Boards to include chronic toxicity monitoring and chronic toxicity effluent limitations in the NPDES permit for all POTW discharges that are authorized to discharge at a rate equal to or greater than five MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020). By requiring all POTW discharges that are authorized discharge at this rate and are required to have a pretreatment program to conduct regular chronic toxicity testing, a measure of protection is assured for their receiving waters.

This option does provide less flexibility to Regional Water Boards in that if any toxicity test conducted within five years prior to permit issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) resulted in a “fail,” or had a percent effect of greater than 10 percent, then reasonable potential would be established. Therefore, Regional Water Boards would have less discretion in how it determines if reasonable potential does or does not exist.

Option 2: Require reasonable potential analysis based only on a “pass/fail” using the TST statistical approach.

Under this option, reasonable potential would only be based on pass/fail results for all toxicity tests conducted using data generated within five years prior to the permit’s issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements), using a minimum of four tests at 100 percent effluent and analyzed using the TST approach. The Water Boards would have discretion to use additional information.

This option would set a new state-wide requirement in which reasonable potential analysis for the numeric chronic toxicity objective is not required for POTW dischargers that are authorized to discharge at a rate equal to or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020). For these dischargers, routine monitoring and effluent limitations would be required.

Procedures for Conducting a Reasonable Potential Analysis

The procedures for conducting a reasonable potential analysis under this option would be similar to the procedures under Option 1 except that the reasonable potential analysis would be conducted using all toxicity tests (with a minimum of four tests) conducted at 100 percent effluent rather than at the IWC.

The procedures for conducting a reasonable potential analysis mirror the reasonable potential analysis in the SIP for priority pollutants. Section 1.3 of the SIP contains a stepwise approach for determining whether a discharge may cause, have reasonable potential to cause, or contribute to an excursion above any applicable priority pollutant objective. The approach in the SIP relies on measurements of the concentrations of priority pollutants in the effluent and the background concentrations of the pollutants in the receiving water. A discharge has reasonable potential if the observed maximum pollutant concentration for the effluent exceeds the water quality objective for that pollutant in the receiving water. A discharge also has reasonable potential if the background concentration exceeds the water quality objective and the pollutant is detected in the effluent. This reasonable potential analysis in the SIP is conducted prior to applying any dilution credits, so that the observed maximum pollutant concentration in the effluent is measured using 100 percent effluent, prior to applying any dilution credit. This procedure, as outlined in Section 1.3 of the SIP, cannot be applied directly to aquatic toxicity because aquatic toxicity does not rely on directly measuring the concentration of a toxic substance, like a priority pollutant, but instead relies on the measured effect on test organisms. For this option to be as similar as possible to the procedure in Section 1.3 of the SIP for determining reasonable potential for priority pollutants, this option would rely on a pass/fail determination using 100 percent effluent, prior to applying any dilution credit.

Under this option, the Provisions would require data from a minimum of four tests conducted at 100 percent effluent within the previous five years to be analyzed using the TST approach. If this minimum amount of data is unavailable, the Water Boards would require the discharger to conduct additional toxicity tests at 100 percent effluent and analyze the data using the TST approach. The Water Boards would be responsible for selecting the species that would be used in conducting these additional toxicity tests for reasonable potential analysis. Species would need to be selected from Table 1 in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions. As with the reasonable potential analysis described in Section 1.3 of the SIP, the Water Boards should review other available information to determine if aquatic toxicity effluent limitations should be required. The Water Boards could review all aquatic toxicity tests for non-storm water NPDES discharges. If any test conducted in the previous five years at a concentration of less than 100 percent effluent were to result in a fail, the Water Boards could use those tests to determine whether reasonable potential exists. The Water Boards could also evaluate older toxicity test data to determine reasonable potential. This procedure is consistent with 40 Code of Federal Regulations part 122.44(d)(1)(ii). If the Water Boards determine that effluent limitations are required based on other information, such as tests at a lower concentration of effluent or older toxicity test data, the Water Boards could waive the requirement to conduct at least four tests at 100 percent effluent.

Procedures for Determining Reasonable Potential

There are three possible outcomes in conducting a reasonable potential analysis:

- If any chronic or acute aquatic toxicity test at 100 percent effluent, analyzed using the TST approach, results in a fail, then the discharge has a reasonable potential to cause or contribute to an excursion above the toxicity water quality objectives.

- If all chronic or acute aquatic toxicity tests at 100 percent effluent, analyzed using the TST approach, result in a "pass" as compared to the mean control response, then the toxicity test data does not indicate reasonable potential to cause or contribute to an excursion above the toxicity water quality objectives. However, other relevant information may still be used by the Regional Board to consider if reasonable potential exists.
- If a discharge does not have at least four chronic or acute aquatic toxicity tests at 100 percent effluent, analyzed using the TST approach, there is not enough information to determine reasonable potential. Additional testing would be conducted at the 100 percent effluent and/or analyzed using the TST approach. However, this requirement may be waived if a Regional Water Board makes a determination, based on other information, that a reasonable potential exists.

If a reasonable potential analysis indicates there is reasonable potential for either chronic or acute toxicity, then the Water Board would be required to include effluent limitations for toxicity in the discharger's NPDES permit.

If reasonable potential analysis indicates there is no reasonable potential, the Regional Water Board may, at its discretion, include a reopener clause in the NPDES permit. The reopener clause would allow the Regional Water Board to reopen the permit and reevaluate the discharger's reasonable potential if and when new data or information becomes available that indicates the facility may, in fact, have a reasonable potential to cause or contribute to an excursion above the toxicity water quality objectives.

Applicability of Reasonable Potential Analysis Requirements

Under this option all POTW discharges that are authorized to discharge at a rate equal to or greater than five MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) would be required to conduct routine chronic toxicity monitoring and meet the chronic toxicity effluent limitation in the NPDES permit. As a result, no chronic toxicity reasonable potential analysis would be required for those dischargers.

All other non-storm water NPDES dischargers must conduct reasonable potential analysis for chronic toxicity prior to every permit issuance, reissuance, or reopening (if the permit reopening is to address toxicity requirements). This includes POTW dischargers that are authorized to discharge at a rate of less than 5 MGD. This also includes POTW dischargers that are authorized to discharge at a rate equal to or greater than 5 MGD but are not required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020).

For acute toxicity, all non-storm water NPDES dischargers are not required to conduct acute toxicity reasonable potential analysis unless specified by the Regional Water Board. In each non-storm water NPDES discharger's NPDES fact sheet (or equivalent document) the Regional Water Board would be required to document the basis for the decision whether to conduct a reasonable potential analysis for acute toxicity.

Comparison with Current Conditions and with the Preferred Option

Currently, there are no consistent statewide procedures for determining when and how to conduct reasonable potential analysis. The Provisions would establish such clear and consistent statewide procedures for determining when and how to conduct reasonable potential analysis for both acute and chronic toxicity. These requirements include specific procedures for determining acute and chronic toxicity and require all POTW dischargers that are authorized to discharge at a rate equal to or greater 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) to conduct chronic toxicity monitoring regardless of reasonable potential. All Regional Water Boards would be required to use pass/fail results from chronic toxicity tests conducted at 100 percent effluent to determine reasonable potential for chronic toxicity for all other non-storm water NPDES dischargers.

Like the preferred option, reasonable potential requirements may initially create a small increase in work to analyze the previous five years of toxicity test data and potentially reanalyze some tests using the TST approach, upon permit issuance, reissuance, or renewal. However, these requirements will afford the long-term benefit of more comprehensive and consistent protection of water quality.

The reasonable potential analysis under this option would always be conducted at 100 percent effluent. The IWC for non-storm water NPDES dischargers that do not have dilution credits would be 100 percent effluent. Therefore, for dischargers that do not have dilution credit, this option would be the same as conducting a reasonable potential analysis at the IWC using pass/fail results only. This option is less stringent than the preferred option because the reasonable potential analysis in the preferred option also includes a 10 percent effect threshold for determining reasonable potential. Therefore, this option is likely to result in fewer dischargers that do not have dilution credits having reasonable potential than the preferred option. This option would likely only require effluent limitations if these dischargers are causing an excursion above the water quality objective. This option would not assess if these dischargers have a reasonable potential to cause or contribute to an excursion above the water quality objective.

For those non-storm water NPDES dischargers with dilution credit for aquatic toxicity, this option may or may not result in fewer dischargers than the preferred option having reasonable potential. Reasonable potential under this option would be established based on pass/fail result from toxicity tests conducted at 100 percent effluent rather than a pass/fail result or a 10 percent effect from toxicity tests conducted at the IWC. Dischargers may need to conduct additional toxicity tests at 100 percent effluent if the minimum four tests are not available for conducting a reasonable potential analysis.

The option would continue to allow the Regional Water Boards to determine reasonable potential based on other factors including, but not limited to, fish die off observations, data using a different concentration than the IWC, lack of available dilution, water quality and beneficial uses of the receiving water, the presence of endangered or threatened species or critical habitat, or existing data on toxic pollutants associated with the discharge.

Therefore, it is likely that where a discharge has been determined to have reasonable potential to cause or contribute to an exceedance of a narrative toxicity water quality objective, that discharge will also be determined to have reasonable potential to cause or contribute to an exceedance of the numeric toxicity water quality objective.

Advantages and Disadvantages

This option has the advantage of providing a clear procedure for analyzing and determining when a non-storm water NPDES discharger has reasonable potential to cause or contribute to an excursion above the toxicity water quality objectives. In some respects, this option is more similar to the reasonable potential analysis for priority pollutants in the SIP than Option 1. However, determining reasonable potential on just a pass or fail of the TST would not be consistent with U.S. EPA's recommendations in Appendix E of U.S. EPA's TST Implementation document to use both a pass/fail determination and a 10 percent effect to determine if a discharger has reasonable potential (U.S. EPA, June 2010).

Although this option may be protective of water bodies with assimilative capacity and available dilution, it would not protect aquatic life beneficial uses from non-storm water NPDES dischargers into effluent dominated streams or waters with no available dilution credit because reasonable potential would not be identified until an exceedance of the water quality objective has occurred. As a result, under this option, reasonable potential to cause or contribute to an excursion of the water quality objective would not be identified for some non-storm water NPDES discharges. This is less protective of aquatic life beneficial uses and does not meet the project's goals.

Option 3: No Action

Under this option, the Water Boards would continue to choose their own method of determining if dischargers have reasonable potential. The Water Boards could use the reasonable potential analysis procedures in the guidelines in the Technical Support Document, the TST Implementation Document, or the Water Boards could rely on other procedures for determining reasonable potential.

One advantage of this approach is that the Water Boards would have flexibility in how to use aquatic toxicity data and other information when determining reasonable potential. A disadvantage of this option is that some Water Boards would remain without clear, understandable procedures, and there would be little consistency between the Water Boards. Some procedures, such as those that require quantifying toxicity into measurable units, may require specific expertise to make a fair assessment and may require considerable staff time and training.

5.4.3 Issue F. What water quality based effluent limitations should be used for toxicity in the State of California?

Current Conditions

As defined in the Clean Water Act, *effluent limitation* means any restriction on “quantities, discharge rates, and concentrations of ‘pollutants’ which are ‘discharged’ from ‘point sources’ into ‘waters of the United States,’ the waters of the “contiguous zone,” or the ocean.” (40 CFR § 122.2). The CWA also requires the implementation of effluent limitations necessary to meet water quality standards established pursuant to state or federal law [33 U.S.C., §1311(b)(1)(C); 40 CFR 122.44(d)(1)]. NPDES permits must contain effluent limitations that control all pollutants that “are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality.” (40 CFR § 122.44(d)(1)(i).) When Regional Water Boards have determined that there is a reasonable potential for the effluent to cause or contribute to an exceedance of the narrative toxicity objective the effluent limitations are expressed in permits as either numeric or narrative effluent limitations. There are a variety of ways in which numeric acute and chronic toxicity effluent limitations are expressed in permits.

Chronic Toxicity Effluent Limitations

Six of the nine Regional Water Boards include numeric triggers, rather than numeric effluent limitations in non-storm water NPDES permits. These numeric triggers are sometimes used in conjunction with narrative effluent limitations, although an exceedance of the numeric trigger may not be considered a violation of the narrative effluent limitation.

The non-storm water NPDES permits that were reviewed for the North Coast and the Central Coast Regions did not contain narrative or numeric effluent limitations for chronic toxicity.

Rather, the non-storm water NPDES permits contain chronic toxicity triggers that, when exceeded, require accelerated monitoring, which could lead to a TRE. The accelerated monitoring triggers are based on pass/fail results using the TST approach to analyze chronic toxicity test data, and the percent effect at the IWC.

The non-storm water NPDES permits that were reviewed in the Central Valley Region varied in the use of effluent limitations and triggers. Some of the permits included a narrative effluent limitation, usually stated as, “there shall be no chronic toxicity in the effluent discharge.” The narrative effluent limitations are used in conjunction with an accelerated monitoring trigger expressed as a TUc value. A TUc is defined in most Central Valley Region permits as TUc = 100/NOEC, 100/IC_{25} or 100/EC_{25}. When no dilution is available, the numeric trigger is set at a level not to exceed 1 TUc. When dilution is available for chronic toxicity, some Central Valley Region permits adjust the effluent limitation based on the amount of dilution available.

Other non-storm water NPDES permits in the Central Valley Region did not include narrative or numeric effluent limitations, but still included an accelerated monitoring trigger expressed as a TUc value. The Central Valley Region Municipal Wastewater Discharger’s General Permit (Order No. R5-2017-0085) includes a chronic numeric median effluent limitation in which effluent shall not exceed 1 TUc and a 25 percent effect at 100 percent effluent, for any endpoint as the median of three consecutive tests over a six-week period.

Non-storm water NPDES permits that were reviewed in the Lahontan Region, that were determined to have reasonable potential for chronic toxicity, contained a narrative effluent limitation stating, "[t]he discharge shall not contain chronic toxicity at a level that would cause or contribute to toxicity in the receiving water…" These permits also contained a numeric trigger to initiate accelerated monitoring, when there is a statistically significant difference between a sample of 100% effluent and a control.

Non-storm water NPDES permits that were reviewed in the Colorado River Region include a narrative water quality objective for chronic toxicity. The narrative chronic toxicity objectives are used in conjunction with a numeric accelerated monitoring trigger based on pass/fail results using the TST approach to assess chronic toxicity test data.

Non-storm water NPDES permits that were reviewed in the San Diego Region included numeric chronic toxicity effluent limitations based on pass/fail results using the TST approach to assess chronic toxicity test data. There were two different MDELs in the three permits that were reviewed for the San Diego Region. One permit only included an MDEL and not an MMEL. In this permit the MDEL is exceeded when a chronic toxicity test at the IWC results in a fail, regardless of the percent effect. The other two permits in the San Diego Region included both a MMEL and a MDEL. In these permits the MDEL is exceeded when chronic toxicity tests, analyzed using the TST statistical approach, results in a fail and the percent effect is greater than or equal to 50 percent for any endpoint. The MMEL for chronic toxicity is exceeded when the median of no more than three independent chronic toxicity tests, conducted within the same calendar month and analyzed using the TST statistical approach, results in a fail.

Non-storm water NPDES permits that were reviewed in the Los Angeles Region included numeric chronic toxicity effluent limitations based on pass/fail results using the TST approach to assess chronic toxicity test data. The permits included both a MDEL and a MMEL. The MDEL is exceeded when a toxicity test results in a fail, and the percent effect is greater than or equal to 50 percent for any endpoint. The MMEL is exceeded when the median result of two out of three chronic toxicity tests, conducted in the same calendar month, result in a fail.

Non-storm water NPDES permits that were reviewed in the San Francisco Region included numeric chronic effluent limitations for all dischargers that were determined to have reasonable potential. The non-storm water NPDES permits with chronic toxicity effluent limitations typically include both an average monthly effluent limitation (AMEL) and an MDEL. The AMELs and MDELs in these permits were derived from a TUc value of 1 TUc at 100 percent effluent. The effluent limitations (both the AMEL and MDEL) was derived in three steps:

1. Convert the 1 TUc criteria to an effluent concentration allowance using the dilution credit specified in the permit.
2. Convert the effluent concentration allowance to a long-term average using a

chronic multiplier.

3. Using the long-term average and corresponding multipliers, calculate the permitted AMEL and MDEL.

The resulting TUc value in the permit for the AMEL corresponds to a higher concentration of effluent than the IWC and the TUc value for the MDEL corresponds to a lower concentration of effluent than the IWC. For example, if a permit has a dilution ratio of 3.25 to 1 the IWC would be 31 percent effluent concentration. Using the procedures outlined above, the AMEL would be 2.7 TUc, which corresponds to a concentration of about 37 percent effluent. The MDEL would be 5.3 TUc, which corresponds to a concentration of about 19 percent effluent.

Two of the permits that were reviewed for refineries in the San Francisco Region included only MDELs for chronic toxicity. In these permits the Regional Water Board did not use the procedures outlined above to calculate the MDEL. Each of these two permits included a 10 to 1 dilution ratio, which resulted in a MDEL of 10 TUc. In these permits the concentrations use to determine compliance with the MDEL would be similar to the IWC in the Provisions.

Acute Toxicity Effluent Limitations

For acute toxicity, most of the numeric effluent limitations in the permits reviewed were expressed as percent survival.

The non-storm water NPDES permits that were reviewed for the North Coast, the Central Valley, and the Lahontan Regions, which contained numeric acute effluent limitations expressed the MDEL as no less than a minimum of 70 percent effect for any one toxicity test, and a MMEL of no less than a median of 90 percent effect for any three consecutive toxicity tests. However, one non-storm water NPDES permit reviewed contained these same thresholds as accelerated monitoring triggers instead of acute toxicity effluent limitations.

Some of the non-storm water NPDES permits that were reviewed in the San Francisco Region also contained numeric acute effluent limitations expressed as a single-sample maximum which states "[a]ny bioassay test showing survival of less than 70 percent represents a violation of this effluent limit", and a three-sample median, which states, "[a] bioassay test showing survival of less than 90 percent represents a violation of this effluent limit if one or more of the past two bioassay tests also shows less than 90 percent survival" (Order No. R2-2015-0021). However, most of the acute effluent limitations in non-storm water NPDES permits in the San Francisco Region are 11-sample median values of not less than 90 percent survival and 11-sample percentile value of not less than 70 percent survival. The 11-sample median value is expressed as, "[a] bioassay test showing survival of less than 90 percent represents a violation of this effluent limit if five or more of the past ten or fewer bioassay tests show less than 90 percent survival." The 11-sample percentile value is expressed as, "[a] bioassay test showing survival of less than 70 percent represents a violation of this effluent limit if one or more of the past ten or fewer bioassay tests show less than 70 percent survival (Order No. R2-2017-0013).

One of the non-storm water NPDES permits that were reviewed in the Central Coast region, contained a numeric acute toxicity effluent limitation. The numeric acute toxicity effluent limitation is based on the percent survival. The permit states, “[t]he presence of acute toxicity shall be determined as significantly reduced survival of test organisms at 100 percent effluent compared to a control using a statistical t-test.” (Order No. R3-2017-0026). No non-storm water NPDES permits that were reviewed for the Central Coast region contained accelerated monitoring triggers for acute toxicity.

The non-storm water NPDES permits that were reviewed in the Santa Ana and Colorado River Regions contained narrative effluent limitations for acute toxicity, but none of the non-storm water NPDES permits that were reviewed contained any numeric effluent limitations or triggers for acute toxicity.

None of the non-storm water NPDES permits that were reviewed in the Los Angeles or San Diego Regions contained any narrative are numeric acute toxicity effluent limitations or triggers for acute toxicity. The permits state that the chronic toxicity effluent limitations are protective of both chronic and acute toxicity. Therefore, acute toxicity effluent limitations were not included in permits with chronic toxicity effluent limitations.

Except for one permit in the Central Coast Region, none of the non-storm water NPDES permits reviewed with numeric effluent limitations for acute toxicity include a statistical approach for assessing compliance with the acute toxicity effluent limitations. Rather, survival is calculated as a simple percent, which doesn’t account for variation or inference. Therefore, using a similar approach for establishing an acute effluent limitation is not considered as a viable option and is not included in the options considered below. The Central Coast Region permit states that the presence of acute toxicity shall be determined using a statistical t-test (Order No. R3-2017- 0026).

Issue Description

None of the Regional Water Board basin plans include detailed specific requirements or direction for establishing water quality based effluent limits for chronic or acute aquatic toxicity. The 2014 U.S. EPA Permit Quality Review for California identified several problems regarding how water quality based effluent limitations were developed in NPDES permits and states “[i]n general, California permits would greatly benefit from a Statewide policy on chronic and acute WET implementation in NPDES permits.” The U.S. EPA cites permit deficiencies stemming from different interpretations of statewide policy and guidance, and recommends the State Water Board develop, clarify and standardize the approach for calculating numeric limitations for toxic pollutants and whole effluent toxicity (U.S. EPA 2014). In Order WQO 2003-0012, the State Water Board determined that (1) the propriety of including numeric effluent limitations for chronic toxicity in NPDES permits for publicly-owned treatment works should be considered in a regulatory setting, in order to allow for full public discussion and deliberation; and (2) the SIP be modified to specifically address the issue. In Resolution No. 2005-0019, the State Water Board directed staff to introduce an amendment to the SIP to address narrative toxicity control provisions. In 2012, staff were directed to incorporate toxicity control provisions as an amendment to the

Water Quality Control Plan for Enclosed Bays and Estuaries of California.

The NPDES regulations in 40 CFR Section 122.45(d) require that for continuous dischargers, all permit limitations be expressed, unless impracticable, as average monthly and maximum daily discharge limitations for all discharges other than POTWs, and as average weekly discharge limitations and average monthly discharger limitations for POTWs. The average weekly discharge limitation is the highest allowable average of "daily discharges" over a calendar week; the maximum daily discharge limitation is the highest allowable discharge measured during a 24-hour period representing a calendar day; the average monthly discharge limitation means the highest allowable average of daily discharges over a calendar month (40 CFR § 122.2).

The NPDES regulations in 40 CFR section 122.45(e) states that discharges which are not continuous shall be particularly described and limited, considering, as appropriate, the frequency, total mass, rate of discharge of pollutants, and prohibition or limitation of pollutants.

The U.S. EPA in the Technical Support Document states that average weekly limits (AWL) for effluent are impracticable for POTWs. Specifically, section 5.2.3 of the Technical Support Document states "in lieu of an AWL for POTWs, EPA recommends establishing MDL [maximum daily effluent limitation] (or a maximum test result for chronic toxicity) for toxic pollutants and pollutant parameters in water quality permitting. This is appropriate for at least two reasons. First, the basis for the 7-day average for POTWs derives from the secondary treatment requirements. This basis is not related to the need for assuring achievement of water quality standards. Second, a 7-day average, which could comprise up to seven or more daily samples, could average out peak toxic concentrations and therefore the discharge's potential for causing acute toxic effects would be missed. An MDL, which is measured by a grab sample, would be toxicologically protective of acutely (higher magnitude) toxic impacts."

An average weekly effluent limitation for acute toxicity is considered impracticable because a weekly effluent limitation would not capture the discharge's potential for peak toxicity. A maximum daily permit limit would be better able to assess the acute toxic effects that occur from a peak toxic concentration. An average weekly effluent limitation for chronic toxicity is also considered impracticable because the toxicity test used to measure chronic toxicity consist of samples collected from at least 3 different days over a variety of test durations. Commencing multiple chronic toxicity tests in a 7-day period would present logistical difficulties for both dischargers and laboratories. A single chronic toxicity test, although initiated on a single day, will by design be influenced by discharges taking place over multiple days. Therefore, the MDEL will capture the chronic toxic effects of the effluent without the costs, resource strain, and logistical challenges of initiating multiple tests over a 7-day period.

The results of the TST analysis are "pass" or "fail" which are not amenable to averaging. Therefore, an average monthly effluent limitation is impracticable, and a monthly median effluent limitation is included in option 1.

MDELs and MMELs for aquatic toxicity are already included in non-storm water NPDES permits throughout California and in other states and are not considered impracticable.

Effluent limitation expression will depend on the water quality objective, selected in Issue A, and the statistical approach selected in Issue C.

Options

Option 1 - Preferred: Use the TST approach to establish maximum daily and median monthly water quality based effluent limitations

This option would require the Water Boards to use MDELs and MMELs based on the TST approach when establishing numeric water quality based effluent limitations in non-storm water NPDES permits for chronic and acute toxicity. This approach would be used in conjunction with Option 1 of Issue A and Option 1 of Issue C.

In State Water Board WQO 2003-0012 (Los Coyotes), as well as other water quality orders, the State Water Board indicated that the propriety of including numeric effluent limitations for chronic toxicity in NPDES permits for POTWs should be considered in a regulatory setting. The proposed adoption of these Toxicity Provisions is that regulatory setting. It is appropriate to include numeric effluent limitations statewide for the reasons identified in this staff report and in the response to comments. The reasons include, but are not limited to, a clear and consistent interpretation and application of what is considered unacceptable toxicity. Currently, narrative aquatic life effluent limitations are applied inconsistently across the state, providing uneven levels of protection of aquatic life beneficial uses and regulatory uncertainty. Numeric effluent limitations would prevent inconsistency among Regional Water Boards in the interpretation and enforcement of the narrative toxicity effluent limitations thereby protecting California's waters from both known and unknown toxicants. Furthermore, numeric aquatic toxicity effluent limitations can be calculated and used as demonstrated by the several Regional Water Boards that have already required numeric effluent limitations for acute and chronic toxicity in NPDES permits. In particular, numeric effluent limitations based on toxicity tests that are analyzed using the TST approach are appropriate because they provide clear pass or fail results that are easy to interpret and use to make a transparent determination of toxicity. The numeric effluent limitations do not rely upon a dilution series or complicated, subjective data interpretation to determine if a test sample is toxic or non-toxic. They provide a high level of confidence in the outcome of each test and therefore provides greater protection of aquatic life.

Chronic Toxicity - Maximum Daily Effluent Limitation

The MDEL is based on toxicity tests, analyzed using the TST approach at the IWC, and the percent effect. The percent effect component of the effluent limitation applies to the survival endpoint of all the methods, unless the test method and species does not include a survival endpoint. For those test methods and species that don't have a survival endpoint the percent effect applies to the sub-lethal endpoint.

The sub-lethal endpoint is used to determine compliance with the MDEL. The sub-lethal endpoints incorporate both the test species sub-lethal (e.g., reproduction, growth, etc.) and survival response. Organisms that don't survive won't continue to germinate, grow, or reproduce. The sub-lethal endpoints are still calculated based on the number of test organisms at test initiation.

The Water Boards would include the following MDEL in the NPDES permit whenever a non- storm water NPDES discharger has reasonable potential to exceed the chronic toxicity water quality objective, or is a POTW discharger that is authorized to discharge at a rate equal to or greater than 5 MGD and is required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020):

> No {most sensitive species} chronic toxicity test shall result in a "fail" at the IWC for the sub-lethal endpoint measured in the test, and a percent effect greater than or equal to 50 percent for the survival endpoint.

When the most sensitive species does not have a survival endpoint, the Regional Water Board would include the following MDEL in the dischargers NPDES permit:

> No {most sensitive species} chronic toxicity test shall result in a "fail" at the IWC for any sub-lethal endpoint measured in the test, and a percent effect for that sub-lethal endpoint greater than or equal to 50 percent.

This determination is made using routine monitoring test results, MMEL compliance test results, or any monitoring conducted with the most sensitive species at the IWC.

If multiple sub-lethal endpoints are measured in a chronic toxicity test (e.g., for giant kelp), there can be no more than a single MDEL violation per toxicity test, even if more than one of the endpoints in the toxicity test has a fail and a percent effect equal to or greater than 50 percent.

An additional threshold of a 50 percent effect is included to be certain the magnitude of toxicity is sufficient by itself to warrant a permit violation. The additional 50 percent effect threshold is consistent with an LC_{50}, which is a measurement often used in toxicology to show a significant toxic effect on test organisms.

Chronic Toxicity - Median Monthly Effluent Limitation

MMELs are designed to address the possible effects of a discharge over a period of a calendar month. Under this option, the MMEL is based on toxicity tests, analyzed using the TST approach at the IWC. Unlike the MDEL, the MMEL does not rely on the percent effect, but instead considers only the pass/fail analysis of the toxicity test data using the TST approach.

As discussed in Issue G, whenever a chronic or acute routine monitoring test results in a "fail", the discharger would be required to conduct two MMEL compliance tests, initiated within the same calendar month as the initial routine monitoring test that resulted in a fail.

The MMEL compliance tests would be conducted using the same test methods and species as the routine monitoring test, and the resulting data would be evaluated using the TST statistical approach. There is a violation of an MMEL when two or more most sensitive species chronic toxicity tests initiated in a calendar month result in a “fail” at the IWC. As shown in Table 5-4, this determination is made using routine monitoring test results, MMEL compliance test results, or any monitoring conducted with the most sensitive species at the IWC.

Whenever a non-storm water NPDES discharger has reasonable potential for chronic toxicity, or is a POTW discharger that is authorized to discharge at a rate equal to or greater than 5 MGD and is required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020), the Regional Water Board would include the following MMEL in the NPDES permit:

> No more than one {most sensitive species} chronic toxicity test initiated in a calendar month shall result in a “fail” at the IWC for any endpoint.

The MMEL uses the median of three toxicity tests conducted within the same calendar month. Two fails within three consecutive toxicity tests is a clear indication that toxicity exists in the effluent. It is statistically improbable that two out of three toxicity tests, conducted within the same calendar month would result in fails through error alone, given the low false positive rate incorporated into the TST approach (for details, please refer to Section J.5 of Appendix J). If the first routine toxicity test results in a pass, the second and third toxicity tests in that calendar month are waived. This procedure allows for ongoing routine monitoring of aquatic toxicity to ensure the protection of the environment, while providing some relief to non-storm water NPDES dischargers from conducting multiple aquatic toxicity tests each calendar month if the initial toxicity test demonstrates that their effluent is non-toxic.

A single toxicity test that results in fails for multiple sub-lethal endpoints (e.g., giant kelp) would not by itself result in a violation of the chronic toxicity MMEL. Note, however, that a fail for one sub-lethal endpoint in one toxicity test followed by a fail of a different sub-lethal endpoint in a subsequent toxicity test initiated within the same calendar month would result in a violation of the chronic toxicity MMEL.

Chronic Toxicity Effluent Limitations After the Effective Date of the Provisions Through December 31, 2023.

During public comment periods and workshops, stakeholders expressed concerns about the reliability of the *Ceriodaphnia dubia* (*C. dubia*) chronic reproduction toxicity test in compliance monitoring programs. The chronic *C. dubia* reproduction toxicity test is a reliable test and is essential in protecting California’s surface waters from toxicity. U.S. EPA conducted a robust method variability study prior to promulgating the *C. dubia* chronic test method. Please refer to the U.S. EPA publication “Final Report: Interlaboratory Variability Study of EPA Short-term Chronic and Acute Whole Effluent Toxicity Test Methods, Vol. 1” (EPA 821-B-01-004) for more information. Some, but not all, laboratories in California have been shown to be able to conduct the *C. dubia* with low intra-laboratory variability. (*See* Appendix J.) The State Water Board is conducting a study titled "Development of Quality Assurance Recommendations for the *Ceriodaphnia dubia* Toxicity Test." The purpose of the study is to investigate test conditions and factors that can be controlled to reduce within-test variability and intra-laboratory variability, improve a laboratory's performance over time, and increase stakeholder and public confidence in the *C. dubia* chronic reproduction toxicity test. The study is not a necessary component of the Toxicity Provisions and is being conducted independently of the Toxicity Provisions because the study focuses on reducing the within-test variability for *C. dubia*, rather than the use of *C. dubia* for compliance purposes. The study is expected to be completed by December 31, 2022.

While the chronic *C. dubia* reproduction toxicity test is a reliable test and is essential in protecting California's surface waters from toxicity, concerns of stakeholders remain regarding laboratory performance when conducting the test and the use of the test in compliance programs. In the long-term, a statewide requirement to include the MDEL and the MMEL using *C. dubia* as the most sensitive species is essential to restrict pollutants and provide the appropriate incentive for dischargers to address the causes of toxicity, and ultimately protect beneficial uses. However, in the short-term only, the statewide inclusion of MMELs using *C. dubia* in non-stormwater NPDES permits is not feasible (i.e., "not appropriate") in certain circumstances specified in Section III.C.5.a (formerly Section IV.B.2.e.i) of the Toxicity Provisions between the effective date of the Provisions and January 1, 2024. (See *Communities for a Better Environment v. State Water Resources Control Board* (2003) 109 Cal. App.4th 1089 affirming the Board's interpretation of "infeasible" as used in 40 Code of Federal Regulations, section 122.449k)(3) to mean "not appropriate"). It is feasible and appropriate that on and after January 1, 2024, all accredited laboratories conduct the reliable and promulgated *C. dubia* chronic reproduction toxicity test. It is also feasible to include the *C. dubia* MDEL without delay, because laboratory performance is less of a concern for stakeholders due to the higher effect level required for a violation of the MDEL. However, for certain laboratories, the application of an MMET using *C. dubia* instead of an MMEL using *C. dubia* prior to January 1, 2024, will provide an opportunity for improvements in laboratory performance, as needed. It would also provide an opportunity for stakeholders to engage in the study so as to improve stakeholder and public confidence.

In determining what testing and compliance should be conducted in the interim (between the effective date and January 1, 2024), two scenarios were developed when the most sensitive species is identified as *C. dubia.* These are identified as Scenario 1 and Scenario 3 option B below. The difference between these two scenarios is based on whether numeric effluent limitations are already included in the current permit. In Scenario 1, the baseline water quality protection is a permit with no numeric effluent limitation. While a delay in application of the MMEL using *C. dubia* would not improve water quality, it is not anticipated that the delay would lessen existing protection of aquatic life beneficial uses within Scenario 1. However, for Scenario 3, both options A and B include an MMEL to avoid the relaxation of existing effluent limitations.

After the effective date of the Toxicity Provisions, dischargers will continue to comply with the requirements in their current permits until permits are issued, renewed, reissued, or reopened. The requirement to include the MMEL indicated in Section III.C.5.d (formerly Section IV.B.2.e.iv) using *C. dubia* as the MOST SENSITIVE SPECIES shall take effect on a statewide basis starting January 1, 2024. For permits that are issued, renewed, reissued, or reopened after the effective date of the Toxicity Provisions and through December 31, 2023, if an effluent limitation is required to be included in the permit, then the following scenarios will apply:

Scenario 1

For dischargers with no numeric chronic aquatic toxicity effluent limitations in their current permit and when *C. dubia* is identified as the most sensitive species, the permit shall include a MDEL using *C. dubia* and a median monthly effluent target (MMET) using *C. dubia* as the most sensitive species if the permitting authority determines that an MMEL using *C. dubia* is not required by federal law. Whenever the permitting authority determines that an MMEL using *C. dubia* must be included in the NPDES permit to comply with federal law, the MMEL using *C. dubia* shall be required instead of the MMET using *C. dubia*. The permitting authority is often a Regional Water Board.

If more than one chronic aquatic toxicity test initiated in a calendar month results in a fail at the IWC for any endpoint, then the MMET is not met. Not meeting the MMET may lead to the implementation of a TRE. Not meeting the MMET is not a violation of an effluent limitations. Targets for determining if a TRE is necessary are further discussed in Option 1 of Issue I.

Scenario 2

For dischargers with no numeric chronic aquatic toxicity effluent limitations in their current permit and when another test species (not *C. dubia*) is identified as the most sensitive species, the permit shall include a MDEL using the most sensitive species (not *C. dubia*) and a MMEL using the most sensitive species (not *C. dubia*).

Scenario 3

For dischargers with numeric effluent limitations in their current permit and when the most sensitive species is identified as *C. dubia*, the permit shall include either:

a. Option A: A MDEL and MMEL using *C. dubia* as the most sensitive species; or
b. Option B: A MDEL using *C. dubia* as the most sensitive species, a MMET using *C. dubia* as the most sensitive species, and a MMEL using *Pimephales promelas* (fathead minnow) or *Selenastrum capricornutum* (green alga) as the most sensitive species.

The permitting authority may choose to include Option B in the NPDES permit if it determines that an MMEL using *C. dubia* is not required by federal law. The permitting authority shall document the basis for this determination in the NPDES fact sheet (or equivalent document). Whenever the permitting authority determines an MMEL using *C. dubia* must be included in the NPDES permit to comply with federal law, the permitting authority shall include Option A in the NPDES permit.

Scenario 4

For dischargers with numeric chronic aquatic toxicity effluent limitations in their current permit and when another test species (not *C. dubia*) is identified as the most sensitive species, the permit shall include a MDEL and a MMEL using the most sensitive species (not *C. dubia*).

The requirements in Scenario 1 and Scenario 3, Option B are only in effect through December 31, 2023. For those scenarios, the permit shall specify that starting January 1, 2024, dischargers must comply with the MDEL indicated in Section III.C.5.c (formerly Section IV.B.2.e.iii) and MMEL indicated in Section III.C.5.d (formerly Section IV.B.2.e.iv) of the Toxicity Provisions, using *C. dubia*. For permits that are issued, reissued, renewed, or reopened after December 31, 2023, if an effluent limitation is required to be included in the permit, the MDEL and MMEL in Section III.C.5.c (formerly Section IV.B.2.e.iii) and Section III.C.5.d (formerly Section IV.B.2.e.iv) must be included.

If the permitting authority makes a determination that an MMEL using *C. dubia* is not needed in order to comply with federal law, the permitting authority would have the choice between Option A or Option B in Scenario 3. In order to make this determination, the permitting authority may review recent control data (e.g., long-run median control CV) from the laboratory used by the discharger to evaluate ongoing laboratory performance. For example, the permitting authority may compare laboratory control performance data to data from laboratories currently meeting the long-run median control CV that is necessary to achieve the acceptable false positive rate (see Table J-7 in Appendix J for this information for California laboratories). The permitting authority could also consider the relative sensitivity of *Pimephales promelas* (fathead minnow) or *Selenastrum capricornutum* (green alga) in determining whether Option A or Option B should be selected for inclusion in the NPDES permit. If the relative sensitivity of the other species is fairly similar to *C. dubia,* Scenario 3 Option B could provide a relatively similar level of protection.

Between the effective date and January 1, 2024, only a small number of NPDES permits are expected to be issued, reissued, renewed, or reopened (to address toxicity requirements), and of those, only some will identify *C. dubia* as the most sensitive species. Any adverse changes to water quality that would result from those permits not applying an MMEL using *C. dubia* before January 1, 2024, are unlikely. In no case is the change expected to adversely affect existing beneficial uses. If there are any adverse changes, they are expected to be minor for the following reasons:

Monitoring using *C. dubia* would still be required and the sensitivity of the species would still be used to determine chronic toxicity of the effluent. The follow-up testing and the determination regarding whether a TRE is needed is the same for the MMET using *C. dubia* and the MMEL using *C. dubia*. A TRE is 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, and then confirm the reduction in toxicity. As discussed in Chapter 9, the cost of conducting a TRE and reducing toxicity through the implementation of toxicity controls can vary depending on the approach chosen but could at times be costly. The TRE itself will also provide a mechanism for identifying the source of toxicity and reducing the toxicity. Therefore, conducting a TRE provides a mechanism to protect aquatic beneficial uses and an incentive for dischargers to not lower water quality.

Lower treatment performance, lower effluent quality, or higher effluent volumes for individual treatment plants as a result of a delay in imposing the *C. dubia* MMEL is also not reasonably expected for the following practical reasons. A delay in the *C. dubia* MMEL will not increase the quantity of influent to, or effluent from, a treatment plant. The facility would still be required to operate in the same manner approved in the NPDES permit. The delayed application of the *C. dubia* MMEL to January 1, 2024, is not an authorization for the discharger to change its treatment system. All permits will continue to require that dischargers properly operate and maintain their treatment systems, as required by 40 Code of Federal Regulations section 122.44. Additionally as already indicated, test results that exceed the MMET would result in added costs and resources associated with a TRE, and any indications of toxicity would also be used to determine reasonable potential for the next permit term. The potential violations associated with having effluent limitations in the next permit term provide an additional incentive for a discharger to maintain the performance of its treatment systems.

Therefore, in totality, no adverse changes in water quality are expected as a result from the delayed implementation of the *C. dubia* MMEL. If there are any adverse changes, those changes would be minor and limited in duration. In the short-term only, the Provisions provide sufficient incentive for dischargers to properly treat their wastewater to avoid toxicity. As a result, delaying the application of the MMEL using *C. dubia* to January 1, 2024, is appropriate and adequately protective of receiving water and beneficial uses and will not result in any significant degradation.

Due to the need to build stakeholder and public confidence in the ability of laboratories to perform well when conducting the chronic *C. dubia* test method for MMEL compliance purposes, it is appropriate, and in the maximum benefit of the people of the state to include a short-term delay in the statewide implementation of the *C. dubia* MMEL, as long as it is consistent with federal law for each permit. In the long-term, mandating a statewide MDEL and MMEL using *C. dubia* is essential to restrict pollutants, to protect beneficial uses, to improve water quality, to investigate and reduce the sources of toxicity, and to provide the appropriate incentive for dischargers to address the causes of toxicity.

The permitting authority at the time of NPDES issuance would need to ensure that the NPDES permit is consistent with federal law and follow the appropriate notice and public comment process. In all cases, the permitting authority will be required to conduct a permit-specific anti-backsliding and antidegradation analysis at the time of permit reissuance or reopening.

As discussed in Chapter 9, it is possible that a relaxation of existing effluent limitations could occur when a current permit includes a MMEL using *C. dubia* as the most sensitive species and the reissuance includes a MMEL using *Pimephales promelas* (fathead minnow) or *Selenastrum capricornutum* (green alga) as the most sensitive species through December 31, 2023. If the permitting authority determines that there is a relaxation of existing effluent limitations, an exception to the anti-backsliding prohibition may apply. If an exception does not apply, then to comply with federal law, the permitting authority would include the MMEL using *C. dubia.*

Likewise, the permitting authority would need to determine if an antidegradation analysis is required at the time of permit issuance, reissuance, renewal, or reopening. The delayed implementation of the *C. dubia* MMEL to January 1, 2024, is expected to not change or only lead to minor adverse changes in water quality for the reasons set forth above. The permitting authority at the time of permit issuance, reissuance, renewal, or reopening would determine if degradation would occur and whether that degradation would be permitted. Again, if required to comply with federal law, the permitting authority would include the MMEL using *C. dubia* in the NPDES permit.

The permitting authority would be required to include the MMEL using *C. dubia* whenever necessary to comply with federal law. Similarly, there may be instances in which the permitting authority concludes that a receiving water limitation based on the numeric water quality objective is required by federal law. The permitting authority must document the basis for its conclusion that federal law does not require the inclusion of the *C. dubia* MMEL in Scenarios 1 or 3, Option B in the permit fact sheet.

Table 5-3 describes the chronic toxicity effluent limitations and effluent targets that will be included in non-storm water NPDES permits that are issued, reissued, renewed, or reopened after the effective date through December 31, 2023. For Scenarios 1 and 3b, the permits will specify that the discharger is required to comply with the chronic toxicity MMEL specified in Section III.C.5.d (formerly Section IV.B.2.e.iv) of the Provisions beginning on January 1, 2024.

Table 5-3. Chronic Toxicity Effluent Limitations for Permits that are Issued, Reissued, Renewed, or Reopened through December 31, 2023

Current Permit Effluent Limitations	Most Sensitive Species Identified for New Permit	Permit Effluent Limitations through December 31, 2023 for New Permits
Scenario 1: No numeric effluent limitations	*C. dubia*	MDEL using *C. dubia* MMET using *C. dubia*
Scenario 2: No numeric effluent limitations	A species that is not *C. dubia*	MDEL using most sensitive species (not *C. dubia*) MMEL using the most sensitive species (not *C. dubia*)
Scenario 3: Existing numeric effluent limitations	*C. dubia*	Option A: MDEL using *C. dubia* MMEL using *C. dubia* Option B: MDEL using *C. dubia* MMET using *C. dubia* MMEL using green alga or fathead minnow
Scenario 4: Existing numeric effluent limitations	A species that is not *C. dubia*	MDEL using most sensitive species (not *C. dubia*) MMEL using most sensitive species (not *C. dubia*)

Acute Toxicity - Maximum Daily Effluent Limitation

The MDEL is based on toxicity tests, analyzed using the TST approach at the IWC, and the percent effect. Compliance with the acute MDEL would be determined by using the TST approach to evaluate test data and the percent effect at the IWC. Whenever a non-storm water NPDES discharger has reasonable potential for acute toxicity the Regional Water Board would include the following MDEL in the discharger's NPDES permit:

> No {most sensitive species} acute toxicity test shall 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 percent.

This determination is made using routine monitoring test results, MMEL compliance test results, or any monitoring conducted with the most sensitive species at the IWC.

To address the concern that a false positive may result in a MDEL violation with a single test, an additional threshold of a 50 percent effect is included to be certain the magnitude of toxicity is high enough by itself to warrant a permit violation. The additional 50 percent effect threshold is consistent with an LC_{50}, which is a measurement often used in toxicology to show a significant toxic effect on test organisms.

Acute Toxicity - Median Monthly Effluent Limitation

Whenever a non-storm water NPDES discharger has reasonable potential for acute toxicity, the Regional Water Board would include the following MMEL in the discharger's NPDES permit:

> No more than one {most sensitive species} acute toxicity test initiated in a calendar month shall result in a "fail" at the IWC for the survival endpoint.

This determination is made using routine monitoring test results, MMEL compliance test results, or any monitoring conducted with the most sensitive species at the IWC.

Table 5-4. Routine Monitoring and MMEL Compliance Tests (Conducted in the Same Calendar Month), and MMEL Violation

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

*Tests are not required

Comparison of Current Conditions and the Preferred Option

Chronic Toxicity

The chronic toxicity effluent limitations in this option are applied differently than chronic toxicity accelerated monitoring triggers, which are contained in several of the non-storm water NPDES permits that were reviewed for the North Coast, Central Coast, Central Valley, Lahontan, Colorado River and Santa Ana Regional Water Boards. Although exceeding the accelerated monitoring triggers does require dischargers to take additional actions, including additional monitoring and possibly a TRE, the triggers do not subject dischargers to violations or possible penalties. The chronic toxicity effluent limitations in the Provisions clearly define what constitutes a violation. Dischargers that receive multiple violations under the Provisions are also subject to additional action, such as conducting a TRE.

The chronic toxicity triggers in the current non-storm water NPDES permits issued by the North Coast, Central Coast, and Colorado River Regional Water Boards are based on the pass/fail results using the TST approach. A test that results in a fail requires the discharger to conduct accelerated monitoring tests, which could lead to a TRE. The triggers are generally consistent with the effluent limitations in the Provisions, because they are based on the same RMDs and use the same statistical approach to evaluate the test data. However as noted above, the triggers are not numeric effluent limitations, therefore, the permit does not define what constitutes a violation.

The chronic toxicity triggers in non-storm water NPDES permits issued by the Central Valley, Lahontan, and Santa Ana Regional Water Boards are based on a threshold of 1 TUc at 100 percent effluent, which is equivalent to a NOEC at 100 percent effluent. If dilution credit is available, some Regional Water Boards adjust the TUc value to establish a trigger that is equivalent to a NOEC at the IWC. The TST Test Drive, which is discussed in greater detail in Option 1 of Issue C compared the results using the TST approach and the current NOEC approach when analyzing toxicity test data at the IWC. The TST Test drive concluded that the total number of exceedances were generally the same overall and the two approaches had similar outcomes on the test results for over 90 percent of the tests that were analyzed.

Therefore, the thresholds used to establish the MMEL for chronic toxicity in the Provisions are generally consistent with the chronic toxicity triggers in many of the non-storm water NPDES permits that were reviewed in the Central Valley, Lahontan, and Santa Ana Regional Water Boards.

Based on analyses comparing results of NOEC and TST data analysis, it is not anticipated that implementing the Provisions will lead to an increase in the number of samples considered toxic. However, the Provisions would establish numeric effluent limitations for acute and chronic aquatic toxicity and define what constitutes a violation. As a result, implementing the Provisions likely will increase the number of violations as compared to the existing toxicity triggers in many permits, which do not result in effluent limitation violations.

The chronic toxicity effluent limitations in the Provisions are consistent with the MMEL and MDEL contained in the non-storm water permits in the Los Angeles Region and some of the non-storm water NPDES permits in the San Diego Region. In both the Provisions and in these non-storm water NPDES permits, the chronic toxicity MMEL is based on the pass/fail results for the median of three chronic toxicity tests conducted in a calendar month and analyzed using the TST approach. The MDEL in these non-storm water NPDES permits and the Provisions are similar, since they are both based on a fail and a 50 percent effect. The difference is that the Provisions use a 50 percent effect for the lethal endpoint, when the test has a lethal endpoint, while the MDEL in the permits uses a 50 percent effect threshold for any endpoint.

In only one non-storm water NPDES permit in the San Diego Region that uses the TST approach, the MDEL is different from both MDELs in the San Diego Region and in the Provisions (R9-2017-0020). In this permit the chronic MDEL is a pass for any chronic toxicity test conducted at the IWC, regardless of the percent effect. Given the difference in the MDELs in the San Diego Region all non-storm water NPDES permits within the San Diego region that discharger to inland surface waters, enclosed bays, and estuaries were reviewed to confirm that no other permits contain this MDEL. Permit R9-2017-0020 is for a discharge to an impaired water body and the MDEL is not representative of other effluent limitations in the region.

The AMELs and the MDELs in non-storm water NPDES permits in the San Francisco Region were derived from a criterion of 1 TUc prior to applying dilution credit. A threshold of 1 TUc is equivalent to a NOEC or an IC_{25} at 100 percent effluent. The AMEL and MDEL for most permits that were reviewed in the San Francisco Region were derived using the steps described above under "Current Conditions." When no dilution is available the AMEL is set at 1 TUc. However, when dilution is available, the resulting AMEL is at a slightly higher concentration of effluent than the IWC.

The San Francisco Regional Water Board typically uses a point estimate approach with an IC_{25} to assess compliance with chronic toxicity effluent limitations. Both the AMEL in the permits and the MMEL in this option rely on the median results of multiple chronic toxicity tests conducted during the calendar month. Both the IC_{25} and the TST approach for chronic toxicity use a 25 percent effect as a threshold for determining when to declare a sample as toxic. In some of the permits that were reviewed for the San Francisco Region, the IC_{25} for the AMEL was applied to a slightly higher concentration of effluent than the IWC. As noted in Option 3 of Issue C, point estimates often lack a confidence interval. Without a confidence interval it is not possible to determine the probable error rates or the statistical confidence of the results. Although difficult to compare the stringency of the effluent limitations when different concentrations are used in each, on balance, no relaxation of water quality based effluent limitations in non-storm water NPDES dischargers permits is expected as a result of incorporating the effluent limitations in the Provisions because use of the TST provide three critical improvements, as described in more detail below.

The MDELs in the reviewed San Francisco Regional Water Board permits are based on a lower concentration of effluent and are exceeded whenever a single test exceeds that limit. It is not possible to determine if a 50 percent effect for the lethal endpoint at the IWC is more, or less stringent than an IC_{25} at a lower concentration of effluent. Therefore, looking only at the use of different concentrations, it is unknown if the MDEL in this option will be more, or less stringent than the MDELs in the existing non-storm water NPDES permits in the San Francisco Region. Although difficult to compare the stringency of the effluent limitations when different concentrations are used in each, on balance, no relaxation of water quality based effluent limitations in non-storm water NPDES dischargers permits is expected as a result of incorporating the effluent limitations in the Provisions. The Provisions would require use of the TST in determining compliance which provides three critical improvements: 1) the incorporation of RMDs and individual test method specific error values that clearly define what effect level is considered toxic; 2) restatement of the null and alternative hypothesis so that dischargers are required to demonstrate that their effluent is not toxic; and 3) the incorporation of both false positive and false negative error rates, providing high confidence in the outcome for each result. Taking into consideration a possible increase in monitoring and the use of the TST, there would not be a relaxation of effluent limitations.

Acute Toxicity

The Provisions would allow the Regional Water Boards to determine, on a case-by-case basis, if a non-storm water NPDES discharger is required to conduct a reasonable potential analysis for acute toxicity. Therefore, the acute toxicity effluent limitations in the Provisions may not apply to many non-storm water NPDES dischargers. Some non-storm water NPDES dischargers that currently have both chronic and acute toxicity effluent limitations in their permits may not be required to have acute toxicity effluent limitations with this option.

Most of the numeric acute toxicity effluent limitations in the permits that were reviewed required discharges to meet both a longer-term 90 percent survival threshold and a short-term 70 percent survival threshold. The 90 percent thresholds are typically a median of three consecutive tests and the 70 percent threshold is typically expressed as a single sample maximum in the permits that were reviewed. However, some permits in the San Francisco Region express these limits over a larger number of samples. These effluent limitations in the permits are calculated as a percent survival, without the use of a statistical approach to assess the variability of the data. Because these effluent limitations do not contain a statistic, they do not account for variation. In contrast the Provisions use the TST approach, which is a clear statistical approach that accounts for variation and provides statistical confidence in the outcomes.

Of the permits that were reviewed, only one permit used a statistical approach to set a numeric effluent limitation for acute toxicity. This permit states, “[t]he presence of acute toxicity shall be determined as significantly reduced survival of test organisms at 100 percent effluent compared to a control using a statistical t-test” (Order No. R3-2017-0026). The TST approach in the Provisions meets these parameters in the permit. The TST approach uses a statistical t-test to compare the sample to a control and defines “significantly reduced survival” through the use of the RMD. Therefore, the acute effluent limitation in the Provisions are consistent with the acute effluent limitation in this permit.

Some of the permits that were reviewed contained numeric triggers, which were generally based on the percent survival, but did not contain numeric effluent limitations. The effluent limitations in the Provisions are anticipated to result in an increase in the number of violations compared to permits with numeric triggers. The reason for this increase is that the Provisions clearly define what constitutes a violation of the daily and the monthly acute toxicity effluent limitations, while the triggers in the permits that were evaluated for these regions do not define effluent limitations or what would constitute a violation.

Advantages and Disadvantages

Using the acute and chronic effluent limitations described above for all non-storm water NPDES permits would provide statewide consistency among permits. This would reduce confusion about how effluent limitations should be established and simplify the permitting process for dischargers and regulators, by providing specific MDEL and MMEL language for inclusion in NPDES permits.

For the Water Boards, using standardized MDELs and MMELs would reduce time spent on developing effluent limitations for aquatic toxicity on a permit-by-permit basis, as each Water Board would use the same process and mathematical calculations. Using the same effluent limitations statewide also makes assessment much easier, because a single system and set of calculations would be required for determining compliance. This would provide a clear understanding of the standards that must be met and what constitutes a violation.

Option 2: Use NOEC or point estimate approaches to establish maximum daily and median monthly water quality based effluent limitations

The Technical Support Document recommends if the NOEC is used that the chronic effluent limitation be expressed as 1 TUc and the acute effluent limitation be expressed as 0.3 TUa. Under this option a chronic effluent limitation of 1 TUc could be established and assessed using either the NOEC statistical approach or a point estimate approach. The NOEC and point estimate approaches are discussed in options 2 and 3 of issue C. A TUc is the reciprocal of 100 divided by the statistical endpoint of either NOEC or EC_{25}. The effluent limitation would be set at 1 TUc, which means that the NOEC or EC_{25} could not be at a concentration of less than 100 percent effluent. Using this approach, the effluent limitation of 1 TUc would be exceeded whenever the NOEC or EC_{25} is less than 100 percent effluent.

Setting a median monthly effluent limitation of 1 TUc would be consistent with current numeric effluent limitations for chronic toxicity in many non-storm water NPDES permits in the State. If dilution is available, the monthly effluent limitation could be adjusted to account for the permitted dilution following guidance in the Technical Support document and using the equations available in Appendix C of the Toxicity Training Tool (Denton et al 2010).

The maximum daily chronic effluent limitation could then be calculated from the monthly median effluent limitation. These calculations are demonstrated for low flow conditions in Table C-2 of Appendix C of the Toxicity Training Tool. Using these calculations for low flow waters, a discharger with a MMEL of 1 TUc would have an MDEL of 1.6 TUc. A MDEL of 1.6 TUc would mean that when the NOEC or EC_{25} is less than 62.5 percent concentration of the effluent, the MDEL is exceeded.

For acute toxicity, EPA recommends a water quality criterion of 0.3 TUa, where a TUa is the reciprocal of 100 divided by the statistical endpoint of LC_{50}. While an effluent limitation of 0.3 TUa is achievable in waters with greater than a 33 percent dilution, such a limitation is not achievable in waters where little or no dilution is available, such as effluent dominated water bodies. Since many dischargers in California discharge into streams that have little or no available dilution, a statewide effluent limitation of 0.3 TUa is not practical.

In situations where a mixing zone and dilution credits are not available the Technical Support Document recommends hypothesis testing be used for the acute toxicity effluent limitation.

Advantages and Disadvantages

The advantage of this option is that the chronic effluent limitations would be similar to the chronic effluent limitations currently found in some permits throughout the State. Therefore, these effluent limitations would not require any significant changes when permits are renewed or reopened. This option would also achieve the goal of statewide consistency.

A disadvantage of this approach is that the U.S. EPA recommended acute effluent limitation of 0.3 TUa is not achievable in effluent dominated water bodies or where dilution and mixing zones are not available. A traditional hypothesis approach could be used to develop a pass/fail test for acute toxicity. Additionally, NOEC requires a dilution series in the laboratory and review of a concentration response curve, often with complex data interpretation proving to be both costly and time consuming. NOEC and LOEC do not clearly define what is unacceptable toxicity (i.e., an RMD), and are not easily understood and interpreted in permits for the purpose of compliance. Such an approach would need to be established and would have the same advantages and disadvantages for using a traditional hypothesis approach as discussed in Issue A and Issue C (Sections 5.1.1 and 5.3.1 of the Staff Report).

For chronic toxicity this option would rely on using either the NOEC statistical approach or a point estimate approach to assess the acute and chronic toxicity data. The advantages and disadvantages of these approaches are discussed in options two and three of Issue C.

Option 3: No action

Under this option, the Regional Water Boards would continue to determine effluent limitations based on the narrative objectives within their respective basin plans and the statistical approach used to analyze aquatic toxicity test data. The Regional Water Boards would also be responsible for setting the number of toxicity tests required to determine compliance.

While this approach would offer the Regional Water Boards the flexibility to adjust compliance requirements to fit specific effluent limitations for the dischargers, the resulting inconsistencies could lead to an inequitable distribution of violations and compliance costs. The Water Boards would continue to lack a statewide approach for developing effluent limitations for toxicity and for determining compliance with chronic and acute toxicity MDELs and MMELs. Therefore, effluent limitations would continue to be inconsistently applied to NPDES permits throughout the state. Continuing a system that relies on only narrative water quality objectives does not produce standardized and comparable measurements of toxicity based on measurements of biological responses.

5.4.4 Issue G. What monitoring frequencies should be established?

Current Conditions

Routine monitoring is required monitoring that is conducted during a permit term. Statewide toxicity testing frequencies for routine monitoring have not been established.

Currently, the North Coast, Los Angeles, Central Valley, Lahontan, Colorado River, and San Diego Regional Water Board basin plans describe a combination of self-monitoring programs and Regional Water Board preformed sampling to ensure compliance with the Water Quality Control Plan, NPDES permits, WDRs, and water quality objectives. The San Francisco Regional Water Board basin plan states that monitoring frequency is based on a case-by-case basis. In addition, the San Francisco Regional Water Board basin plan also states that "dischargers with chronic toxicity limits in their permits monitoring quarterly or less frequently are required to accelerate the frequency to monthly (or as otherwise specified by the Executive Officer) when conditions such as those listed in Table 4-5 occur." Table 4-5 in the San Francisco Regional Water Board basin plan lists effluent limitations for dischargers in the form of TUs. The Central Coast Regional Water Board has the following language, "For discharges between 1 and 10 MGD, the monitoring frequency shall be at least one complete scan of the Table B substances annually. Discharges greater than 10 MGD shall be required to monitor at least semiannually." The Santa Ana Regional Water Quality Control Board (Santa Ana Regional Water Board) basin plan states, "The sampling frequency, locations, constituents, and other details vary from year to year depending on identified problems and needs, and on staff and funding availability."

A review of representative non-storm water NPDES permits from each of the regions found that dischargers permitted to discharge at a rate of less than 5 MGD typically have a monitoring frequency for chronic toxicity WET testing of either quarterly, semi-annually or annually. For those non-storm water NPDES dischargers with a permitted discharge rate of greater than 5 MGD, the chronic toxicity monitoring frequency is typically monthly or quarterly.

For acute toxicity, some non-storm water NPDES dischargers rely upon flow-through acute monitoring systems. When static acute WET testing is required, several non-storm water NPDES dischargers that are permitted to discharge at a rate of less than 5 MGD have monitoring frequencies of quarterly, semi-annually, or annually and non-storm water NPDES dischargers that are permitted to discharger at a rate of greater than 5 MGD typically have a monitoring frequency of quarterly. Most of the permits require dischargers to initiate an accelerated monitoring schedule whenever the results of a chronic or acute toxicity test exceeds a numeric effluent limitation or trigger. Accelerated monitoring typically consists of four toxicity tests conducted once every two weeks, however some permits have an accelerated monitoring frequency of once a month. Some non-storm water NPDES permits that contain MMELs include requirements for MMEL compliance monitoring, which consists of two MMEL compliance tests, whenever a routine chronic or acute toxicity test results in a fail.

Issue Description

Routine monitoring frequency for toxicity varies widely among the numerous dischargers located throughout the state. These inconsistencies harbor the potential to undermine the aquatic life beneficial uses of receiving waters and may offer economic advantages to those dischargers that are seldom or never required to conduct toxicity tests. In addition to establishing a consistent regulatory framework, a routine schedule of toxicity tests would help maintain the biological integrity of receiving waters by acting as a backstop against the additive and synergistic effects of known and unknown pollutants.

There are inconsistencies in how Regional Water Boards address monitoring frequency. Even though the North Coast, Los Angeles, Central Valley, Lahontan, Colorado River, and San Diego Regional Water Boards have similar language in their basin plans, the language provides dischargers with self-monitoring programs with Regional Water Board oversight. Such language is not very prescriptive and allows for inconsistencies in the monitoring frequency between the regions and the dischargers.

Options

Option 1 - Preferred: Establish statewide monitoring schedules for non-storm water NPDES dischargers

Under this option, all non-storm water NPDES dischargers would be required to conduct aquatic toxicity monitoring. For dischargers that have chronic or acute toxicity effluent limitations, monitoring would include MDEL and MMEL compliance monitoring. For dischargers that do not have chronic toxicity effluent limitations, monitoring would include MDET and MMET monitoring to determine whether a TRE is needed. The MDEL and MMEL are discussed in Option 1 of Issue F. The MDET and MMET are discussed in Option 1 of Issue I.

MDEL and MMEL compliance monitoring would consist of 1) routine monitoring tests, 2) MMEL compliance tests, and 3) additional routine monitoring tests for TRE determination and compliance. Routine monitoring tests for non-storm water NPDES dischargers would be used to determine compliance with the MDEL. Routine monitoring tests would also be used, in conjunction with the MMEL compliance tests, to determine compliance with the MDEL and MMEL. However, as discussed below, MMEL compliance tests would only be required if the routine monitoring toxicity test results in a fail.

MDET and MMET monitoring consists of 1) routine monitoring, 2) MMET tests, and 3) additional routine monitoring tests for TRE determination. Routine monitoring tests would be used, in conjunction with MMET tests to determine if the MDET and MMET have been met. MMET tests are only required if the routine monitoring test results in a fail. Monitoring targets are designed to trigger TREs in a similar manner as the violation of effluent limitations. However, the monitoring targets only assess for chronic toxicity, not acute toxicity. Additionally, MDET and MMETs would be used to determine when a TRE is required but they are not effluent limitations, and so MDET and MMET monitoring would not be used to determine compliance with an effluent limitation.

This option would require routine monitoring for non-storm water NPDES dischargers at either a monthly, quarterly, or biannual frequency, depending on the authorized rate of discharge in the NPDES permit, as explained in more detail in section 5.4.4.2.1 of the Staff Report. For dischargers with a monthly routine monitoring frequency, a routine monitoring test would only be required in months during which there is expected to be at least 15 days of discharge. For dischargers with a quarterly routine monitoring frequency, a routine monitoring test would only be required in quarters during which there is expected to be at least 15 days of discharge. For dischargers with a biannual routine monitoring frequency, routine monitoring tests would only be required if there is at least one quarter in a calendar year in which there is expected to be at least 15 days of discharge. The reason for only requiring routine monitoring if there is a minimum amount of discharge is to ensure that there is sufficient effluent available to collect the initial discharge sample and refresh water samples to conduct a toxicity test in accordance with the required toxicity test methods, as listed in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions. In addition, when there is no effluent available to complete a routine monitoring test, MMEL compliance test, or MMET test, the test is not required, and the routine monitoring continues in the frequency specified in the permit.

Routine monitoring, MMEL compliance tests, and MMET tests would be conducted at the IWC using the most sensitive species identified by the Regional Water Board and would be analyzed using the TST.

Under this option, the Regional Water Board may also require dischargers to conduct additional toxicity testing, such as special studies, tests using additional test species or additional dilutions or higher concentrations of effluent than the IWC, or monitoring specific to flow-through acute toxicity testing systems.

5.4.4.1. Defining the Start of the Calendar Month, Calendar Quarter, and Calendar Year

Several portions of the Provisions would require the Regional Water Boards to include permit requirements that rely upon the use of a calendar month, calendar quarter, and calendar year.

Initiation of a test begins upon sample collection. For example, when collecting a grab sample, initiation of a test begins the moment the grab sample has been collected. When collecting a composite sample, commonly collected over a 24-hour period, initiation of a test begins after the 24-hour time period, when the composite sample has been collected. Completion of a test means the test has been terminated at the prescribed time (e.g., 96 hours, 7 days) and test acceptability criteria (TAC) as indicated in the U.S. EPA-approved method have been met. If these conditions are not met, the test cannot be considered complete and the test cannot be used to meet monitoring requirements for conducting aquatic toxicity tests.

5.4.4.1.1. Monthly Routine Monitoring

For dischargers with a monthly routine monitoring frequency, the Regional Water Board would specify the start of the calendar month in the permit. For example, a permit could specify that the calendar month starts on the first of each month, or that the calendar month starts on the 12th of each month. If a calendar month starts on the 12th of each month, it would run through the 11th of the following month. Specifying the day of the month that corresponds to the start of the calendar month is necessary to ensure that routine and MMEL compliance tests are associated with a single calendar month. The Regional Water Boards would also have the discretion to specify in the permit the exact dates or time periods in which the samples for the routine monitoring tests for chronic toxicity must be collected. For example, a Regional Water Board may require samples to be taken by the 10th day of each calendar month, or between the 15th and the 20th of each month. Any specified sample collection dates or time periods would need to be consistent with a monthly routine monitoring frequency.

In setting the start of the calendar month, there is some flexibility granted in the Toxicity Provisions to allow dischargers and laboratories to work with their Regional Water Board to define the start of the calendar month, as long as there are 12 distinct calendar months within a calendar year. The Regional Water Board would consider the relevant scheduling constraints identified by the discharger and the applicable laboratories. For example, many laboratories serve multiple non-storm water NPDES dischargers that may prefer to conduct their routine monitoring test on, or shortly after the same day each month. To maximize the available space within a laboratory and staff resources, many laboratories may prefer to initiate a consistent number of routine monitoring tests each week. Laboratories would not be able to maintain this consistency if the calendar month starts on the same day for all their clients. Therefore, laboratories may prefer to stagger the start of the calendar months for their clients to maximize their staff and laboratory resources. In this way laboratories should not be overwhelmed at the beginning of each month. The start of the calendar month can be defined, and routine monitoring tests can be scheduled to provide sufficient time for each discharger to initiate two MMEL compliance tests within that calendar month, should they be required.

5.4.4.1.2. Quarterly Routine Monitoring

For dischargers with a quarterly routine monitoring frequency, the Regional Water Board would not specify the day of the month that corresponds to the start of the calendar month. For these dischargers, the start of the calendar month would begin at the initiation of the routine monitoring test (e.g., when the sample has been collected). For those monitoring on a quarterly frequency, the time period between the start of each routine monitoring test is greater and there is less concern of overlapping compliance testing periods. For example, the next calendar month would not begin until sometime in the next quarter, upon initiation of the next routine monitoring test.

To the extent feasible, routine monitoring tests would be evenly distributed across the calendar year or period of seasonal or intermittent discharge.

The Regional Water Board would specify the day and month that corresponds with the start of each calendar quarter. In setting the start of the calendar quarter, the Regional Water Board would work with the dischargers and laboratories to define the calendar quarter and consider relevant scheduling constraints identified by the discharger and applicable laboratories, as discussed above.

The Regional Water Board may specify the exact dates or time period for the discharger to initiate the routine monitoring test. For example, the Regional Water Board could require the discharger to initiate a test within thirty days of the start of the calendar quarter. Dischargers with a quarterly routine monitoring frequency should initiate the routine monitoring test early within the calendar quarter so that the calendar month for the initial routine monitoring test does not extend into the subsequent calendar quarter. Initiating a test early in the calendar quarter will help distinguish compliance periods from each other. For example, if a calendar quarter starts on January first and ends on March thirty first, if possible, the discharger should not initiate a routine monitoring test any later than March first, one month before the end of the calendar quarter. If the routine monitoring test is initiated after that date the calendar month would extend into the next calendar quarter and end sometime in April. However, for intermittent and seasonal dischargers initiating the routine monitoring test within the first two months of the calendar quarter may not be possible because there may not be sufficient effluent discharge during that time to conduct a chronic toxicity test. For example, a discharger may only discharge 15 to 20 days in a calendar quarter, and all discharge may occur near the end of the last month of that quarter. In such circumstances the routine monitoring test should be initiated as soon as possible, and the Regional Water Board should be notified if the calendar month may extend into the following calendar quarter.

5.4.4.1.3. Biannual Routine Monitoring

For dischargers with a biannual routine monitoring frequency, the Regional Water Board does not need to specify the day of the month that corresponds to the start of the calendar month. For these dischargers, the start of the calendar month would begin at the initiation of the routine monitoring test (e.g., when the sample has been collected). For those monitoring twice a year, the time period between the start of each routine monitoring test is greater and there is less concern of overlapping compliance testing periods. For example, the next calendar month would not begin until initiation of the next routine monitoring test.

To the extent feasible, routine monitoring tests would be evenly distributed across the calendar year or period of seasonal or intermittent discharge.

The Regional Water Board would specify the day and month that corresponds with the start of each calendar year. In setting the start of the calendar year, the Regional Water Board would work with the dischargers and laboratories to define the calendar year and consider relevant scheduling constraints identified by the discharger and applicable laboratories, as discussed above.

The Regional Water Board may specify the exact dates or time period for the discharger to initiate the routine monitoring test. For example, the Regional Water Board could require the discharger to initiate a test within the first month and the seventh month of the calendar year. These dischargers should initiate a routine monitoring test early enough within the compliance period so that the calendar month for the initial routine monitoring test does not overlap with the next compliance period. Initiating a test early in the compliance period will help distinguish compliance periods from each other. For example, if a calendar year starts on January first and ends on December thirty first, the discharger should not initiate the first routine monitoring test later than November first if possible. If the first routine monitoring tests were to be initiated after the beginning of November it would carry over to the middle of December and the second calendar month would be initiated in the middle of December and would then extend into January, overlapping with the subsequent calendar year.

5.4.4.2. Toxicity Monitoring for Dischargers With Effluent Limitations

Aquatic toxicity monitoring would be required for non-storm water NPDES dischargers with toxicity effluent limitations.

5.4.4.2.1. Routine Monitoring Schedule for Chronic Toxicity

The routine monitoring frequency for chronic aquatic toxicity testing would be determined by the authorized rate of discharge in the NPDES permit. Regional Water Boards will be responsible for determining the authorized rate of discharge. In doing so, Regional Water Boards may designate the average dry weather flow specified in the NPDES permit as the authorized rate of discharge. The average dry weather flow is typically the design flow the treatment facility is capable of biologically treating on an average basis under dry weather flow conditions. Regional Water Boards should not use a flow that is calculated to be less than the average dry weather flow as the authorized rate of discharge.

Monthly routine monitoring for chronic toxicity would be required of all POTW discharges that are authorized to discharge at a rate of 5 MGD or greater and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020). Monthly routine monitoring would also be required of all other non-storm water NPDES dischargers with reasonable potential that are authorized to discharge at a rate of 5 MGD or greater, including POTWs that are not required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020).

Quarterly routine monitoring for chronic toxicity would be required for non-storm water NPDES dischargers with reasonable potential (including POTW dischargers) authorized to discharge at a rate of less than 5.0 MGD, except for POTW dischargers authorized to discharge at a rate of less than or equal to 1.0 MGD.

Biannual routine monitoring for chronic toxicity would be required for POTW dischargers with reasonable potential authorized to discharge at a rate of less than or equal to 1 MGD.

5.4.4.2.2. Changing the Routine Monitoring Schedule for Chronic Toxicity

Under this option, the Regional Water Boards may establish a more or less frequent monitoring schedule for chronic toxicity routine monitoring.

5.4.4.2.2.1. Increasing the Routine Monitoring Schedule for Chronic Toxicity

Reasons that the Regional Water Boards may have for increasing the frequency for chronic routine monitoring include, but are not limited to:

- Ongoing issues with chronic toxicity associated with the facility's discharge or the receiving water;
- Species in the receiving water that have high sensitivity to contaminants that may be in the discharge;
- Threatened or endangered species that live in or rely on the receiving waters; or
- Facilities that work with or use highly toxic materials that may potentially be discharged with the effluent.

The Regional Water Boards may set a more frequent chronic routine monitoring frequency by documenting the justification in the NPDES fact sheet or Water Code section 13383 Order.

5.4.4.2.2.2. Reducing the Routine Monitoring Schedule for Chronic Toxicity

The Regional Water Boards would also be able to establish a reduced frequency of chronic routine monitoring for eligible dischargers upon reissuance, renewal, or reopening (if permit reopening is to address toxicity requirements) of an NPDES permit.

If a non-storm water NPDES discharger's permit includes the chronic toxicity MDEL and MMEL as specified in Section III.C.5 (formerly Section IV.B.2.e) of the Provisions, the Regional Water Board may approve a reduced routine monitoring frequency for the discharger upon reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the NPDES permit when, during the prior five consecutive years, the following conditions have been met:

1) The MDEL and MMEL have not been violated; and
2) The toxicity requirements in the NPDES permit have been followed.

If a non-storm water NPDES discharger's permit does not include the chronic toxicity MDEL and MMEL as specified in Section III.C.5 (formerly Section IV.B.2.e) of the Provisions, the Regional Water Board may approve a reduced routine monitoring frequency for the discharger upon reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) of the NPDES permit when, during the prior five consecutive years, the following conditions have been met:

1) The toxicity requirements in the applicable NPDES permit(s) have been followed; and
2) A minimum of ten chronic toxicity tests have been conducted at the IWC or at a concentration of effluent higher than the IWC; and
3) All chronic aquatic toxicity test data are analyzed or reanalyzed using the TST; and
4) No chronic toxicity test has resulted in a "fail" at the IWC or, if the test was not conducted at the IWC, at a concentration of effluent higher than the IWC.

For eligible non-storm water NPDES dischargers, including POTW dischargers that are authorized to discharge at a rate of 5 MGD or greater and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020), the Regional Water Boards could approve a reduced frequency routine monitoring schedule from one chronic toxicity test per calendar month to one per calendar quarter. For eligible non-storm water NPDES dischargers, including POTW dischargers, which are authorized to discharge at a rate of less than 5 MGD, the Regional Water Boards could approve a reduced frequency routine monitoring schedule from one chronic toxicity test per calendar quarter to two chronic toxicity tests per calendar year.

The Regional Water Board could also reduce the routine monitoring frequency for chronic toxicity to as few as two chronic toxicity tests per calendar year for dischargers that have high dilution providing that the discharger continues to meet the requirements for a reduced monitoring frequency and:

1) The discharger has an initial dilution of at least 10:1, and
2) For dischargers authorized to discharge at a rate equal to or greater than 5.0 MGD, the Regional Water Board requires two additional monitoring tests conducted at a concentration of effluent that is at least double the IWC, in which this additional monitoring may be used to determine whether a TRE is necessary.

Dischargers with an initial dilution of 10 to one or greater may have difficulty detecting toxicity in the effluent. By requiring additional monitoring tests using a higher concentration of effluent, that is at least double the IWC, such dischargers can better detect the presence of any toxicants in their effluent, and then take corrective action to eliminate the toxicant. These additional monitoring tests, using a higher concentration of effluent, would not be subject to a MDEL or MMEL violation. These additional monitoring tests should be used to determine if a TRE is needed.

If at any time a non-storm water NPDES discharger fails to meet any of the requirements for a reduced monitoring frequency as listed above, the discharger would need to return to the monitoring frequency required in Section III.C.4 (formerly Section IV.B.2.d) of the Provisions. Discharges may also be required to return to the monitoring schedule for other reasons including major changes to the treatment facility or changes to the quality of the influent. Either of these changes has the potential to negatively impact the quality of the effluent. For example, adding a new type of commercial or industrial discharger to a POTW's incoming waste stream may change the nature of their influent and treatment may not be sufficient to remove one or more potentially new toxicants. Upon returning to a routine monitoring schedule, as described in Section III.C.4 (formerly Section IV.B.2.d) of the Provisions, eligible dischargers will need to, once again, meet the conditions one and two, listed above, in that the MDEL and MMEL have not been violated and the toxicity requirements in the NPDES permit have been followed, for a period of five years before the Regional Water Board could approve a new reduced monitoring frequency for chronic toxicity. The Provisions require the conditions to be met for a minimum of five years to establish a consistent pattern prior to allowing a reduced monitoring frequency.

The rationale for an increase or reduction in routine monitoring would have to be documented in an NPDES fact sheet. The chronic routine monitoring frequency could, in no case, be less than twice per calendar year.

5.4.4.2.2.3. Reducing the Routine Monitoring Schedule for Chronic Toxicity During a TRE

The Water Boards could also include language in a non-storm water NPDES permit that would allow their Executive Officer or Executive Director to approve a temporary reduction in the prescribed routine monitoring frequency as described in Section III.C.4.b.i(B) (formerly Section IV.B.2.d.ii.(A)(2)) of the Provisions while the dischargers is conducting a TRE and conducting toxicity testing as part of the TRE.. During the time when a discharger is conducting a TRE, the Water Boards may allow the Executive Officer or Executive Director to temporarily reduce the routine monitoring frequency to as few as two chronic routine toxicity tests per calendar year. The reduced monitoring frequency during a TRE could be for a period of up to one year from the date the TRE is initiated. Dischargers under a temporarily reduced monitoring frequency would be required to return to a routine monitoring schedule as described in Section III.C.4 (formerly Section IV.B.2.d) of the Provisions, at the conclusion of the TRE or after one year from the start of the TRE, whichever occurs earlier.

Table 5-5. Chronic Toxicity Routine Monitoring Frequency

Discharger Type	Chronic Monitoring Frequency
POTWs ≥ 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a)	Monthly
POTWs ≥ 5 MGD and are not required to have a pretreatment program by the terms of 40 CFR § 403.8(a) with RP	Monthly
POTWs < 5 MGD but > 1 MGD with RP	Quarterly
POTWs ≤ 1 MGD with RP	Biannually
Other non-storm water NPDES dischargers ≥ 5 MGD with RP	Monthly
Other non-storm water NPDES dischargers < 5 MGD with RP	Quarterly
All non-storm water NPDES dischargers without RP*	Biannually

RP = reasonable potential
*except POTWs ≥ 5 MGD that are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020)

5.4.4.2.3. Routine Monitoring Schedule for Acute Toxicity

[Note: the December 2020 version of the Staff Report incorrectly identified this section as 5.4.4.2.2]

For acute toxicity, the Water Boards would set the routine monitoring frequency for dischargers with reasonable potential for acute toxicity. The routine monitoring frequency would not be less than once per calendar year. The Water Boards would have discretion to specify or not specify the exact dates or time period in which a sample for routine monitoring would need to be taken. To the extent feasible, routine monitoring tests for acute toxicity would need to be evenly distributed across the calendar year or period of seasonal or intermittent discharge.

Although both chronic and acute toxicity samples may be collected at the same time, dischargers required to conduct routine monitoring for both chronic and acute toxicity would need to analyze the chronic and acute samples separately. Samples must be analyzed using the appropriate chronic and acute toxicity test methods as described in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions.

Non-storm water NPDES dischargers with reasonable potential for acute toxicity would not be allowed to substitute a flow-through acute toxicity testing system for routine monitoring for acute toxicity. However, a Regional Water Board would have the discretion to consider if a discharger is using or is required to use a flow-through acute toxicity testing system, when determining the appropriate routine monitoring frequency for acute toxicity.

5.4.4.2.4. Additional Routine Monitoring Testing for TRE Determination and Compliance

[Note: the December 2020 version of the Staff Report incorrectly identified this section as 5.4.4.2.3]

For both chronic and acute toxicity, a TRE is required whenever there is determined to be persistent toxicity. However, for non-storm water NPDES dischargers that are required to conduct routine monitoring at a less-than-monthly frequency, monitoring may be too infrequent to determine when persistent toxicity exists. Therefore, under this option, additional routine monitoring tests for acute or chronic toxicity could be required for TRE determination and compliance. This option would be paired with Option 1 of Issue I for determining when a TRE is required.

The additional routine monitoring test would allow regulators to determine if the toxicity that resulted in a violation of an effluent limitation in a particular month is persistent and would cause a violation of an effluent limitation in the successive month. In this case, if a non-storm water NPDES discharger receives a single violation in any calendar month, but not two violations, they could be required to initiate an additional routine monitoring test within two weeks, following the calendar month in which the violation occurred. If this additional monitoring test contributes to a violation of the MDEL or MMEL in the following month, the discharger would be subject to a TRE.

For non-continuous dischargers, when there is no effluent available to initiate an additional routine monitoring test, this additional routine monitoring test would not be required. Routine monitoring would continue in the frequency specified in the permit, and the Water Boards would have the discretion to require a TRE.

5.4.4.2.5. MMEL Compliance Tests

[Note: the December 2020 version of the Staff Report incorrectly identified this section as 5.4.4.2.4]

Under this option, whenever an acute or chronic toxicity routine monitoring test results in a “pass” at the IWC, the discharger is not required to conduct any MMEL compliance tests during that compliance period (e.g., month, quarter, etc.).

If an acute or chronic toxicity routine monitoring test results in a “fail” at the IWC, then non-storm water NPDES dischargers would have to conduct a maximum of two MMEL compliance tests within the same calendar month as the routine monitoring test.

If the first MMEL compliance test results in a “fail” at the IWC, then the discharge is in violation of the MMEL and the second MMEL compliance test is waived.

If the first MMEL compliance test results in a “pass” at the IWC, then the discharger must conduct the second MMEL compliance test. If the second MMEL compliance test results in a “fail” at the IWC, then the discharge is in violation of the MMEL.

If both the first and the second MMEL compliance tests result in a “pass” at the IWC, then the discharger is in compliance with the MMEL and no additional monitoring test for that compliance period is required; however, routine monitoring at the frequency specified in the NPDES permit would resume.

The MMEL compliance tests would be initiated within the same calendar month as the routine monitoring test that resulted in the “fail” at the IWC. As long as the MMEL compliance tests are initiated within the same calendar month as the routine monitoring test, the laboratory procedures and analysis procedures of the MMEL compliance tests themselves may carry over into the following calendar month.

This option relies upon a calendar month instead of a six-week or 45-day time period for several reasons. If the initiation of MMEL compliance tests overlap into successive calendar months, it would be difficult to distinguish the routine monitoring in one calendar month from the compliance monitoring in consecutive calendar months, making it difficult to distinguish if a discharger has complied with their MMEL. Also, affording dischargers up to three toxicity tests to determine compliance provides dischargers with two additional opportunities to demonstrate the effluent is not toxic to aquatic life. An alternative to using up to three toxicity tests within a calendar month would be to assess compliance with the MMEL using a single toxicity test.

Section III.C.4 (formerly Section IV.B.2.d) of the Provisions specifies that when a routine monitoring test results in a fail and there is no effluent available to initiate an MMEL compliance test, the MMEL compliance test is not required, and the routine monitoring would continue at the frequency specified in the permit. If effluent is available to conduct the first MMEL compliance test, then the discharger must initiate that test even if they anticipate that there will be insufficient effluent to initiate two MMEL compliance tests within that same calendar month. If there is insufficient effluent to conduct a second MMEL compliance test, the MMEL would be assessed based on the routine monitoring test and the first MMEL compliance test. For example, if both the routine monitoring test and the first MMEL compliance test result in a fail, then the discharger would be in violation of the MMEL. If the routine monitoring test results in a fail, the first MMEL compliance test results in a pass, and there is insufficient effluent for a second MMEL compliance test, then the discharger would not be in violation of the MMEL. If the routine monitoring results in a fail and there is insufficient effluent to conduct any MMEL compliance tests in that calendar month, then the discharger would not be found in violation of the MMEL for that calendar month.

Like the routine monitoring test, each MMEL compliance test is subject to a possible MDEL violation.

5.4.4.3. Toxicity Monitoring for Dischargers Without Effluent Limitations

All non-storm water NPDES dischargers that do not have effluent limitations would be required to conduct chronic aquatic toxicity routine monitoring and MMET tests. This target monitoring would be used with the MDET and MMET to determine whether a TRE is required. This approach would work in conjunction with Option 1 of Issue I to determine when a TRE is necessary.

5.4.4.3.1. Routine Monitoring Schedule for Chronic Toxicity

All non-storm water NPDES dischargers that do not have effluent limitations would be required to conduct at least two routine monitoring tests during any calendar year in which there is expected to be at least 15 days of discharge in at least one calendar quarter.

Initiation of a routine monitoring test would be at a time that would allow corresponding MMET tests to be initiated within the same calendar month. To the extent feasible, routine monitoring tests would be evenly distributed across the calendar year or period of seasonal or intermittent discharge.

The Regional Water Board would have discretion to set the routine monitoring frequency at a biannual routine monitoring to quarterly, monthly, or more frequent routine monitoring.

5.4.4.3.1.1. Additional Routine Monitoring Tests for TRE Determination

A TRE is required whenever there is determined to be persistent toxicity. However, when monitoring for targets, the required biannual monitoring frequency may be too infrequent to determine when persistent toxicity exists. Therefore, additional routine monitoring testing would allow regulators to determine if a failure to meet a target in one month is due to persistent toxicity.

An additional routine monitoring test would be required when one MDET or MMET is not met in a single calendar month. The additional routine monitoring test would be initiated within two weeks following the calendar month in which the MDET or MMET was not met. The additional monitoring test would not be used for compliance purposes.

An additional routine monitoring test would not be required when both the MDET and MMET are not met, if the discharger is already conducting a TRE, or if the discharger is required to conduct routine monitoring at a monthly monitoring frequency, or more frequently.

When there is no effluent available to complete the additional routine monitoring test, the additional test is not required, and the routine monitoring continues as specified in the NPDES permit.

5.4.4.3.2. MMET Tests

Unlike MMEL compliance tests, MMET tests are used to determine if a MMET has been met to determine whether a TRE is needed rather than to determine compliance with the MMEL. Failure to meet the MMET does not result in a violation of the effluent limitation, but may result in the need to conduct a TRE as discussed in Option 1 of Issue I.

If a routine monitoring test results in a “pass” at the IWC, the discharger is not required to conduct any MMET tests during that required monitoring period.

If a routine monitoring test results in a “fail” at the IWC, then non-storm water NPDES dischargers would have to conduct a maximum of two MMET tests within the same calendar month as the routine monitoring test.

If the first MMET test results in a “fail” at the IWC, the MMET is not met, and the second MMET test is waived. If the first MMET test results in a “pass” at the IWC, then discharger must conduct the second MMET test. If the second MMET test results in a “fail” at the IWC, then the MMET is not met. If both the first and the second MMET tests result in a “pass” at the IWC, then the discharger has met the MMET and the discharger would not be required to perform any additional monitoring test for that required monitoring period, but would continue routine monitoring at the frequency specified in the NPDES permit.

Section III.C.4 (formerly Section IV.B.2.d) of the Provisions specifies that when a routine monitoring test results in a fail and there is no effluent available to initiate an MMET test, the MMET test is not required, and the routine monitoring would continue at the frequency specified in the permit. If effluent is available to conduct the first MMET test, then the discharger must initiate that test even if they anticipate that there will be insufficient effluent to initiate two MMET tests within that calendar month. If there is insufficient effluent to conduct a second MMET test, the MMET would be assessed based on the routine monitoring test and the first MMET test. For example, if both the routine monitoring test and the first MMET test result in a fail, then the MMET would not be met. If the routine monitoring test results in a fail, the first MMET test results in a pass, and there is insufficient effluent for a second MMET test, then the MMET would be met. If the routine monitoring results in a fail and there is insufficient effluent to conduct any MMET tests in that calendar month, then then MMET would not be met.

Like the routine monitoring test, each MMET test is subject to not meeting the MDET.

5.4.4.4. Replacement Tests for Routine Monitoring, MMEL Compliance Tests, and MMET Tests

When a required toxicity test for routine monitoring, MMEL compliance tests, or MMET tests is not completed, a new toxicity test to replace the toxicity test that was not completed shall be initiated as soon as possible.

There may be circumstances outside of a discharger's control that prohibit them from initiating required monitoring tests within the time frame specified in the Provisions. To account for such possible circumstances, the Provisions would require the Water Boards to specify in non-storm water NPDES permits, or Water Code section 13383 Orders, that a test is not required to be initiated within the specified time period because of circumstances outside of the discharger's control that were not preventable with the reasonable exercise of care and the discharger promptly initiates and completes a replacement test.

Circumstances outside the discharger's control may include a toxicity test not meeting TAC, dead or delayed shipment of ordered organisms, problems with shipment or transport of samples, laboratory power outage, etc.

When the permitting authority determines that the test was not initiated in the required time period because of such circumstances, then the discharger will not obtain a violation for that failure if the discharger promptly initiates and completes a replacement test. In this limited circumstance, replacement routine monitoring tests, replacement MMEL compliance tests, or replacement MMET tests could be initiated outside of the calendar month for which they are intended. However, in all cases a replacement test must be initiated as soon as possible. A replacement test would not be used to substitute any other required toxicity tests.

Because Section III.C.4.d (formerly Section IV.B.2.d.iv) requires replacement tests to be initiated as soon as possible and because replacement tests cannot substitute for any other required toxicity tests, it is possible that replacement tests may have to be conducted concurrently with the routine monitoring tests, MMEL compliance tests, or MMET tests required in the subsequent calendar month. Dischargers with a monthly routine monitoring frequency would still be required to initiate routine monitoring test at a time that would allow any required MMEL compliance tests or MMET tests to be initiated within the same calendar month as the routine monitoring test as is required by Section III.C.4.b.i(A) (formerly Section IV.B.2.d.ii.(A)(1)) of the Provisions.

5.4.4.5. Comparison of Current Conditions and the Preferred Option

Under this option, all non-storm water NPDES dischargers would be required to conduct chronic aquatic toxicity testing, which would be used to determine whether chronic toxicity effluent limitations or chronic toxicity monitoring targets are met. Dischargers with reasonable potential for acute toxicity would be required to conduct aquatic toxicity testing. Currently, not all non-storm water NPDES dischargers are required to conduct aquatic toxicity testing and implementing this requirement would increase monitoring for these dischargers. For many dischargers that are already monitoring for chronic and/or acute toxicity, the routine monitoring frequency would increase. An increase in monitoring may help dischargers identify toxicity in their effluent when toxicity is present and take the necessary steps to eliminate potential toxicity in the receiving water. This could have the benefit of improving water quality in receiving waters and downstream from discharge points.

There is variation and inconsistency in how Regional Water Boards address monitoring frequencies for non-storm water NPDES dischargers. Some of the non-storm water NPDES permits that were reviewed, which authorized the discharger to discharge at a rate of 5 MGD or greater had a monitoring frequency of monthly, but others included a chronic toxicity monitoring frequency of quarterly or less. Non-storm water NPDES permits that were reviewed, which authorized the discharger to discharge at a rate of less than 5 MGD included chronic toxicity monitoring frequencies of quarterly, semi-annually, or annually. Under this option, for non-storm water NPDES dischargers that have effluent limitations, the chronic toxicity routine monitoring frequency would be determined by the authorized rate of discharge in the NPDES permit. The frequency for discharges authorized to discharger 5 MGD or greater would be monthly, the frequency for those discharges that are authorized to discharge less than 5 MGD would be quarterly, except for POTW dischargers authorized to discharge less than or equal to 1 MGD, which would have a biannual routine monitoring frequency. This option also includes a biannual routine monitoring frequency for dischargers without chronic toxicity effluent limitations. In addition, under this option, when a fail occurs, the discharger would need to initiate two MMEL compliance tests if they have chronic toxicity effluent limitations, or MMET tests if they do not have effluent limitations, within the same calendar month. Currently, most non-storm water NPDES permits require the discharger to conduct either two MMEL compliance tests or a series of accelerated monitoring tests whenever a toxicity test results in a fail or an exceedance of a numeric trigger or effluent limitation.

A recent review of the current chronic toxicity routine monitoring frequencies in the 2020 Economic Report for non-storm water NPDES permits indicates that about 79 percent of non-storm water NPDES permits are likely to have an increase in the routine monitoring frequency for chronic toxicity under the Provisions. About 19 percent are likely to have the same monitoring frequency and about two percent are likely to see a reduction in their routine monitoring frequency under the Provisions (See Tables 9-4 and 9-5 in Chapter 9). An increase in monitoring frequency may result in an increased likelihood of detecting toxicity when it occurs, as more samples would be taken and analyzed throughout the year. An increase in monitoring frequency would likely have the benefit of improving water quality, since steps to reduce or eliminate the toxicity could be taken, if toxicity is detected in effluent. Routine monitoring may lead to MMEL compliance monitoring, and possible TREs, as dischargers take necessary steps to identify and address toxicity in effluent.

Under this option, Regional Water Boards could reduce the routine chronic toxicity monitoring frequency for those dischargers that meet the requirements for qualifying for a reduced monitoring schedule. Eligible non-storm water NPDES dischargers, including POTW dischargers, that are authorized to discharge at a rate of 5 MGD or greater, could have an approved reduction in routine monitoring frequency from one chronic toxicity test per calendar month to one per calendar quarter, or two tests per calendar year for dischargers with high dilution and that conduct additional monitoring. Eligible non-storm water NPDES dischargers, including POTW dischargers, which are authorized to discharge at a rate of less than 5 MGD, could have an approved reduced frequency in routine monitoring from one chronic toxicity test per calendar quarter to two chronic toxicity tests per calendar year. However, it is anticipated that under this option most non-storm water NPDES dischargers would be required to conduct either monthly, quarterly, or biannual routine chronic toxicity monitoring in accordance with their authorized rate of discharge. Regional Water Boards currently determine the routine monitoring frequency for non-storm water NPDES dischargers within their regions, including a reduced monitoring frequency where appropriate. Therefore, allowing Regional Water Boards to approve a reduction in the chronic toxicity routine monitoring frequency for eligible dischargers is not likely to result in less frequent chronic toxicity routine monitoring than exists in current non-storm water NPDES permits.

Under this option, the routine monitoring frequency for acute toxicity would be determined by the Water Boards for those dischargers that are determined to have a reasonable potential for acute toxicity. The routine monitoring frequency would not be less than once per calendar year. This is consistent with the current conditions for routine acute toxicity monitoring. However, under this option flow-through acute toxicity monitoring cannot be substituted for acute toxicity routine monitoring. Therefore, under this option board staff anticipates little or no change in acute toxicity routine monitoring frequencies for those facilities that do not employ flow-through acute toxicity monitoring. For those facilities that demonstrate reasonable potential for acute toxicity and use a flow-through acute toxicity system, the dischargers will need to conduct static acute toxicity tests at a frequency determined by the Regional Water Board, but not less than once per calendar year.

Advantages and Disadvantages

The advantages of this option are that it would establish a uniform quantity of routinely scheduled toxicity tests that would help maintain the biological integrity of receiving waters. These routine monitoring requirements would be consistent throughout the state, ensuring the same level of protection in all regions. Requiring larger volume dischargers to conduct monthly routine monitoring for chronic toxicity would also contribute toward protecting and maintaining the biological integrity of receiving waters throughout California. Regional Water Boards would have the option of reducing the monitoring frequency for dischargers that comply with effluent limitations and permit terms and could also increase the routine monitoring frequency for any discharges that represent a higher threat to aquatic life or the environment, or increase the frequency for other reasons. This option would also maintain the option of reducing routine monitoring while a discharger is conducting a TRE to allow the discharger to concentrate resources on finding and eliminating the source of toxicity. Regional Water Boards would also have the discretion for setting the appropriate monitoring frequency for acute toxicity, however, this frequency would be at least once per year.

The disadvantages of this option are that it provides less flexibility to Regional Water Boards in determining the chronic toxicity monitoring frequencies for non-storm water NPDES dischargers. Dischargers would need to meet certain conditions before the chronic monitoring frequency could be reduced. Regional Water Boards would have the flexibility to increase the routine monitoring frequency to protect aquatic life where needed, but the Regional Water Board would need to provide a rationale for any increase in chronic toxicity monitoring frequency. Another disadvantage is that quarterly monitoring frequency for small volume dischargers may lead to gaps in routine monitoring for chronic toxicity. Regional Water Boards may also choose to only require minimal routine acute toxicity monitoring when reasonable potential exists. However, for those permits that were reviewed, the Provisions would require dischargers to monitor at the same frequency as they are currently, or in some cases, more frequently. In addition, for discharges with a low volume of effluent and that have had no history of exceedances or violations for toxicity in their effluent, quarterly or less frequent monitoring may be appropriate to monitor for potential toxicity in the effluent, as these dischargers pose less of a threat than high volume dischargers.

An additional disadvantage of this option is that the requirement for all non-storm water NPDES dischargers to conduct aquatic toxicity monitoring may increase costs. Also, the requirement to initiate both MMEL compliance tests within the same calendar month as the initial routine monitoring test may increase the costs of MMEL compliance tests and place difficult time restraints on dischargers and on laboratories. However, if MMEL compliance tests are allowed to carry over into subsequent calendar months it may be difficult to distinguish between the MMEL compliance tests for the first month and routine monitoring test and MMEL compliance tests in the ensuing month. Similarly, these disadvantages would apply to the MMET for dischargers without effluent limitations

Option 2: *No Action*

Under this option, the Water Boards would retain the discretion to establish the frequency of both chronic and acute toxicity testing for all dischargers. While the Regional Water

Board staff would be able to individually tailor monitoring schedules based upon their in-depth knowledge of the water bodies located within their jurisdiction, requirements would continue to vary from region to region and among dischargers. This option has the advantage of allowing the Water Boards greater discretion and flexibility in setting monitoring frequencies, but it may result in continued discrepancies in the monitoring frequencies for similar dischargers.

A disadvantage of this option is that there would continue to be a lack of statewide consistency for routine monitoring frequency for both chronic and acute toxicity monitoring. Routine toxicity monitoring schedules would continue to be determined on a case-by-case basis. Some Regional Water Boards include triggers in non-storm water NPDES permits requiring increased monitoring if certain conditions are not met. These conditions are not consistent from region to region. In some cases, dischargers are required to increase their frequency if certain conditions are not met, but those same conditions may not trigger an increased monitoring frequency in other regions. This again displays inconsistent requirements across the state that could result in continued discrepancies between similar dischargers.

5.4.5 Issue H. How should Mixing Zones and Dilution Credits be determined?

Current Conditions

A mixing zone is a limited zone of receiving water that is allocated for mixing with a wastewater discharge where a water quality objective can be exceeded without causing adverse effect to the overall water body. A dilution credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Where there is assimilative capacity in receiving waters, mixing zones and dilution credits may be allowed for most pollutants. The purpose of mixing zones and dilution credits is to grant some regulatory relief to dischargers where dilution exists within the receiving water, while still maintaining water quality objectives and protecting beneficial uses.

Federal regulations allow the use of mixing zones in the application of standards. 40 CFR 131.13 says that, “States may, at their discretion, include in their state standards, policies, generally affecting their application and implementation, such as mixing zones, low flows, and variances. Such policies are subject to EPA review and approval.” Further, 40 CFR 122.44(d)(1)(ii) says, “When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a state water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water.”

The SIP allows mixing zones and dilution credits for constituents with CTR criteria and for acute and chronic aquatic toxicity. However, the SIP prohibits mixing zones from causing acute toxicity conditions for aquatic life passing through the mixing zone. No allowances are included in the SIP for non-CTR constituents. Requirements for establishing mixing zones are also contained in several of the basin plans. Some of the basin plans refer to mixing zones and dilution credits in a couple of sentences, where others only refer to the SIP, and yet others do not include any information on mixing zones and dilution credits. Examples of what is found in the basin plans is discussed below in this section.

Regional Water Boards, at their discretion allow mixing zones and dilution credits for aquatic toxicity testing in individual permits, in accordance with the requirements in the SIP and in their individual basin plans.

Currently, the Central Valley Water Board has the following language: "In conjunction with the issuance of NPDES and storm water permits, the Regional Water Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional Water Board that the mixing zone will not adversely impact beneficial uses. If allowed, different mixing zones may be designated for different types of objectives, including, but not limited to, acute aquatic life objectives, chronic aquatic life objectives, human health objectives, and acute and chronic whole effluent toxicity objectives, depending in part on the averaging period over which the objectives apply." For mixing zones, Central Valley Water Board considers the applicable procedures and guidelines in U.S. EPA's Water Quality Standards Handbook and the Technical Support Document for Water Quality-based Toxics Control.

San Francisco Bay, Los Angeles, and San Diego Water Boards' basin plans contain similar language regarding mixing zones. They basically state that dilution credit may be granted on a discharger-by-discharger and pollutant-by-pollutant basis. North Coast, Central Coast, Colorado River, and Santa Ana Water Boards' basin Plans do not have information pertaining to mixing zones and dilution credits for freshwater. San Francisco Bay, Los Angeles, and Lahontan Water Boards' basin plans refer to the requirements contained in the SIP for establishing mixing zones and dilution credits.

A review of representative non-storm water NPDES permits from each of the regions found that many of the permits do not include mixing zones or dilution credits for whole effluent chronic toxicity. Where mixing zones are granted, the dilution credit depends on the volume and assimilative capacity of the receiving water. The representative review of permits did not find any permits that allow mixing zones or dilution credits for acute aquatic toxicity.

Issue Description

Since the SIP contains mixing zone and dilution credit requirements for CTR constituents and chronic aquatic toxicity, the Regional Water Boards may establish mixing zones and dilution credits for individual non-storm water NPDES permits. Some Regional Water Boards contain information in their basin plans providing further direction on how to establish mixing zones and dilution credits.

Specific requirements for dilution credits and mixing zones would help facilitate consistent statewide requirements for aquatic toxicity for all non-storm water NPDES dischargers. Without statewide requirements for dilution credits and mixing zones for aquatic toxicity, the Regional Water Boards would continue to rely on the requirements in SIP and their individual basin plans for determining if mixing zones and dilution credits are allowed for aquatic toxicity in individual non-storm water NPDES permits.

There are inconsistencies regarding how mixing zones and dilution credits are established for aquatic toxicity in permits from region to region due to either an absence of mixing zones and dilution credits procedures in their basin plans, or inconsistencies in how the requirements in the SIP are applied when establishing mixing zones and dilution credits for aquatic toxicity in NPDES permits.

Options

Option 1 - Preferred: Provide specific requirements for Regional Water Boards to allow mixing zones and dilution credits for chronic toxicity

Under this option, the Provisions would provide Regional Water Boards the continued discretion to grant mixing zones and dilution credits for acute or chronic toxicity to non-storm water NPDES dischargers on a discharge-by-discharge basis. The Provisions would not require Regional Water Boards to grant mixing zones, but the Provisions would specify that a Regional Water Board may allow mixing zones and dilution credits for acute or chronic toxicity when sufficient capacity exists in the receiving waters for dilution and mixing zones. Any mixing zones or dilution credits established in a non-storm water NPDES permit for meeting the chronic or acute effluent limits in the Provisions must be granted in accordance with section 1.4.2 of the SIP.

As described in the SIP, any permit allowing mixing zones or dilution credits would need to specify the method by which the mixing zone was derived, the dilution ratio calculated, the IWC granted, and the point(s) in the receiving water where the applicable objectives must be met.

In granting a mixing zone, Regional Water Boards would need to ensure that a mixing zone meets the requirements specified in Section 1.4.2 of the SIP. For example, mixing zones would not be allowed to:

1) Compromise the integrity of the entire water body;
2) Cause acutely toxic conditions to aquatic life passing through the mixing zone;
3) Adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or state endangered species laws; or
4) Overlap a mixing zone from a different outfall.

When a Regional Water Board is considering granting dilution credit and a mixing zone for aquatic toxicity, an aquatic toxicity test should first be performed using undiluted sample(s) of receiving water to determine if background toxicity in the receiving water exceeds the water quality objective. The results should be analyzed using the TST approach. An exceedance of the objective in the receiving water (e.g., the sample toxicity test results in a fail) may indicate the lack of assimilative capacity and the Regional Water Board should consider not granting a dilution credit. In such cases, the undiluted effluent should be used as the IWC for reasonable potential and compliance purposes. If the results of a toxicity test using undiluted sample(s) of receiving water results in a pass, assimilative capacity may exist, and a dilution credit may be granted.

Dischargers requesting dilution credits and a mixing zone would need to include all relevant information in their application for an NPDES permit to allow the Regional Water Board to make a determination of the appropriate mixing zone and dilution credit. Relevant information would include, but not be limited to monitoring information, including upstream and downstream of the point of discharge, receiving water body flow data, special studies, modeling, sensitive or critical habitats near the outfall, and any species of concern with habitat in or around the receiving water.

When a dilution credit and mixing zone are granted, the IWC is the concentration of the effluent in the receiving water after mixing. The IWC is calculated as:

IWC = 1 / (1+D) X 100%

Where D is the dilution credit.

However, to provide a higher level of protection for receiving waters, including waters that may contain threatened or endangered species, sensitive habitats, or that have other possible sources of toxicants, the Regional Water Board may set the IWC at a concentration of effluent greater than the inverse of 1 plus the dilution credit. In this case, the Regional Water Board must document the basis for the decision in the NPDES Fact Sheet or equivalent document.

The Toxicity Provisions define the IWC as the inverse of 1 plus the dilution credit multiplied by 100 percent. The dilution credit would be determined by the permitting authority in accordance with section 1.4.2.1 of the SIP. When no dilution credit is granted the IWC would be 100 percent effluent. In addition, the Regional Water Board does not need to grant the same IWC for both chronic and acute toxicity. For example, a discharger may be granted dilution credit for chronic toxicity, but no dilution credit for acute toxicity.

Mixing zones for acute and chronic toxicity must not impede the passage of aquatic life in streams and rivers. Several aquatic species in California depend on the ability to migrate up and down streams and rivers. Migratory fish, both fresh and anadromous are critically important to maintaining ecosystem heath as they serve to transport nutrients upstream—for example pacific salmon transfer large quantities of marine-derived nutrients to the adjacent forest ecosystems with profound effects on plant and wildlife production (Moyle 2006). Additionally, migration is also important for breeding, and therefore protection of the species (Sommer et al. 2013). Migrants including sturgeon and several salmonids are among the world's, and California's, most endangered fishes (Moyles 2002; Pikitch et al. 2005, Service 2007).

Comparison of Current Conditions and the Preferred Option

Under this option, Regional Water Boards would continue to have the discretion to grant mixing zones and dilution credits to dischargers for acute or chronic toxicity on a discharge-by-discharge basis. Regional Water Boards could continue to grant mixing zones and dilution credits for acute or chronic toxicity to discharges where those mixing zones and dilution credits currently exists and where the Regional Water Board determines that mixing zones and dilution credits are appropriate. The requirements in the Provisions rely on guidance in the SIP for establishing mixing zones and dilution credits for acute or chronic toxicity.

Advantages and Disadvantages

The advantage of this option is that it would provide clear direction on granting mixing zones and dilution credit for aquatic toxicity for non-storm water NPDES dischargers. The Provisions would continue to provide some regulatory relief to dischargers by allowing Regional Water Boards to establish a less stringent IWC for acute or chronic toxicity.

This option would not be as protective as prohibiting mixing zones and dilution credits. However, Regional Water Boards would still have the discretion to or not to allow dilution credits and mixing zones where appropriate. This option provides a greater degree of clarity in specifying the requirements and procedures for establishing dilution credits and a mixing zone for aquatic toxicity.

Option 2: Prohibit mixing zones and dilution credits

In this option, mixing zones and dilution credits would be prohibited for both acute and chronic toxicity. The Provisions would supersede all allowances in the basin plans for mixing zones and dilution credits prohibiting their use statewide for aquatic toxicity. For all non-storm water NPDES dischargers, the IWC in the permit would be 100 percent effluent.

This option would be the most protective of California's water because it would ensure that all undiluted effluent is nontoxic prior to any dilution or discharge into surface waters. However, this option may be overly protective for many waters in the state that have the capacity for dilution and mixing zones. In addition, this option may be very costly to dischargers that rely on dilution credits to meet chronic toxicity objectives.

Option 3: No action

In this option, the Provisions would be silent on mixing zones and dilution credits. Regional

Water Boards would continue to rely on the requirements in the SIP and in their basin plans to determine dilution credits and mixing zones for aquatic toxicity.

An advantage of this option is that Regional Water Boards would continue to have direct control, using the requirements in the SIP and their basin plans, for determining appropriate dilution credits and mixing zones. Regional Water Boards would also maintain the discretion to or not to allow mixing zones when appropriate. This allows Regional Water Boards greater control over water quality requirements within their individual basins.

A disadvantage of this option is that it offers less statewide consistency. Regional Water Boards would continue to interpret and apply the requirements in the SIP differently for aquatic toxicity. This could result in some non-storm water NPDES dischargers having more stringent permit requirements than similar facilities discharging into similar waters in other regions. In addition, Regional Water Boards that do allow mixing zones and dilution credits may set different conditions for determining when mixing zones and dilution credits are appropriate.

5.4.6 Issue I. How should we determine when a toxicity reduction evaluation is required?

Current Conditions

A TRE, toxicity reduction evaluation, is a step-wise process that is used to identify the cause of effluent or ambient toxicity in a water body. TREs are used to isolate the source of toxicity, and to evaluate the effectiveness of the available toxicity control options. Once control options are implemented, the discharger and Regional Water Board then confirm the reduction in toxicity.

A Toxicity Identification Evaluation (TIE) is a study that attempts to characterize, identify, and then confirm the specific cause of toxicity observed in aquatic toxicity testing. TIEs generally include a step-by-step process of testing and analysis for identifying suspected toxicants in an effluent. U.S. EPA has developed specific, multi-phased guidelines for conducting TIEs (U.S. EPA 1999). TIEs can sometimes prove difficult, as toxicity may be transient or may be caused by interactions from two or more toxicants. While the Provisions do not include a requirement for conducting TIEs, a discharger may incorporate a TIE as a part of a TRE.

As indicated in Section 4 of the SIP, "[i]f a discharge causes or contributes to chronic toxicity in a receiving water body, a toxicity reduction evaluation (TRE) is required." The SIP also allows multiple facilities that discharge to the same receiving water body to coordinate TREs at the discretion of the Regional Water Board. Additionally, permits must include a condition that requires a discharger to take every reasonable step to control toxicity once the source is identified, and provide a statement addressing potential enforcement action for any facility that fails to conduct a TRE.

Currently, the North Coast, San Francisco Bay, Central Coast, and Santa Ana Regional

Water Quality Control Boards have similar language in their basin plans describing the TRE process. The North Coast Water Board's basin plan states: "If a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table B [located in North Coast basin plan], a toxicity reduction evaluation (TRE) is required. The TRE shall include all reasonable steps to identify the source of toxicity. Once the source(s) of toxicity is identified, the discharger shall take all reasonable steps necessary to reduce toxicity to the required level." In addition, San Francisco Bay Water Board's basin plan further explains that a TRE may be required when "…chronic toxicity still exists and new techniques for identifying and reducing toxicity become available."

The Los Angeles Regional Water Board's basin plan states, "[e]ffluent limits for specific toxicants can be established by the Regional Board to control toxicity identified under Toxicity Identification Evaluations (TIEs)," however they do not provide narrative specifically regarding TREs. The Central Valley, Lahontan, Colorado River Basin, and San Diego Regional Water Quality Control Boards do not have specific information regarding TREs in their basin plans.

A review of representative non-storm water NPDES permits from each of the regions found that non-storm water NPDES permits typically include a specified approach for determining when a discharger is required to initiate a TRE. For chronic toxicity or acute toxicity, if the result of any aquatic toxicity test exceeds the specified trigger or effluent limitation in the permit, the permittee is required to initiate accelerated monitoring. Accelerated monitoring typically consists of four chronic or acute toxicity tests conducted at approximately two-week intervals over an eight-week period. However, some permits have accelerated monitoring consisting of a total of four toxicity tests conducted once a month over a four-month period. Should any of the additional samples taken for accelerated monitoring exceed the specified trigger, the permittee is required to initiate a TRE in accordance with requirements in their permit and the discharger's TRE work plan.

A list of some TREs from California and throughout the United States is included in Appendix H.

Issue Description

Existing TRE requirements in Section 4 of the SIP obligate dischargers to conduct a TRE if a discharge is causing or contributing to chronic toxicity in a receiving water body. However, the SIP does not specify how to determine when a discharge is causing or contributing to toxicity in a receiving water body. Procedures that determine when a discharge causes or contributes to toxicity are left to the discretion of each Regional Water Board. While this approach has provided a great deal of flexibility for Regional Water Boards, regulatory discrepancies have arisen, including the use and duration of accelerated monitoring schedules prior to TRE implementation.

There are inconsistencies between Regions regarding which steps a discharger must take for the Regional Board to determine if a TRE should be conducted. There are also inconsistencies for how to interpret testing results to confirm that a TRE is required. These inconsistencies are due to either differences in the basin plans, as with the North Coast, San Francisco Bay, and Central Coast Regional Water Quality Control Boards, or an absence of TRE procedures in the basin plans, as is the case for the remainder of the Regional Water Boards. The establishment of statewide TRE requirements to manage toxicity exceedances will promote uniformity and reduce these disparities.

Options

Option 1 - Preferred: Require a TRE when there are two or more violations, or when targets are not met two or more times, in two consecutive months.

Under this option, a TRE would be required whenever a discharger has persistent toxicity. Persistent toxicity would primarily be determined in one of two ways. For non-storm water NPDES dischargers with effluent limitations, persistent toxicity would be determined based on any combination of two or more MDEL or MMEL violations within a single calendar month or within two successive calendar months. For non-storm water NPDES discharges without effluent limitations, persistent toxicity would be determined based on a discharger's failure to meet the MDET or MMET, in any combination, two or more times within a single calendar month, or within two successive calendar months. For example, if a discharger were to conduct a routine toxicity test which resulted in a violation of the MDEL and, after conducting MMEL compliance tests, it was determined that the discharger also had violated the MMEL within that same calendar month, then the discharger would be required to conduct a TRE. A similar example could be applied for targets. If both the MDET and MMET are not met in a single calendar month, then the discharger would be required to conduct a TRE.

The violations could also be in successive months. For example, if a discharger were to have a MMEL violation in a given calendar month and a subsequent MMEL or a MDEL violation in the following calendar month the discharger would be required to conduct a TRE. A similar example could be applied for targets. If a discharger failed to meet the MMET in a given calendar month and failed to meet the MMET or MDET in the following calendar month, then the discharger would be required to conduct a TRE.

If a discharger has both acute and chronic effluent limitations and is required to conduct both acute and chronic routine toxicity monitoring in a calendar month, any violations for acute and chronic toxicity would not be considered separately. For example, if a discharger were to conduct both acute and chronic toxicity tests in a given calendar month and both the acute and chronic toxicity tests resulted in MMEL violations, the discharger would have two violations in that calendar month and would be required to conduct a TRE. Violations of acute and chronic effluent limitations could also occur in successive months. For example, if a discharger has a MMEL violation in one calendar month for chronic toxicity and a MMEL violation in the subsequent calendar month for acute toxicity, then the discharger would have two violations within two successive calendar months and would be required to conduct a TRE.

In addition, the Water Board may require a TRE if other information indicates toxicity, such as results from additional monitoring, results from monitoring at a higher concentration than the IWC, fish kills, or intermittent recurring toxicity. Additional monitoring could include monitoring from flow-through acute toxicity testing systems or toxicity testing using test methods that are not included in Table 1 of the Provisions. If a non-storm water NPDES permit includes effluent limitations for flow-through acute toxicity testing systems or methods not included in Table 1 of the Provisions, a violation of one of these effluent limitations would not contribute toward the two or more violations of the MDEL or MMEL specified in the Provisions. However, a Regional Water Board may consider these violations as an indication of toxicity and require the discharger to conduct a TRE.

Chronic Toxicity Maximum Daily Effluent Target (MDET)

The MDET is similar to the MDEL, except that the MDET applies to dischargers that do not have effluent limitations for chronic aquatic toxicity and failure to meet the MDET does not result in a violation. The MDET is based on chronic toxicity tests, analyzed using the TST approach at the IWC, and the percent effect. The Provisions do not include a MDET for acute toxicity.

The percent effect component applies to the survival endpoints of all the methods, unless the test method and species does not include a survival endpoint. For those test methods and species that don't have a survival endpoint, the percent effect applies to the sub-lethal endpoint. The sub-lethal endpoints incorporate both the test species sub-lethal (e.g., reproduction, growth, etc.) and survival response. Organisms that don't survive would not continue to germinate, grow, or reproduce. The sub-lethal endpoints are calculated based on the number of test organisms at test initiation. If multiple sub-lethal endpoints are measured in a target test (e.g., for giant kelp), there can be no more than a single failure to meet the MDET per toxicity test, even if more than one of the endpoints in the toxicity test has a fail and a percent effect equal to or greater than 50 percent.

The Water Boards would include the following MDET in the NPDES permit whenever a non-storm water NPDES discharger does not have effluent limitations for chronic aquatic toxicity:

> "No {most sensitive species} chronic aquatic 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 percent."

When the most sensitive species does not have a survival endpoint, the Water Boards would include the following MDET in the dischargers NPDES permit:

> "No {most sensitive species} chronic aquatic toxicity test shall result in a "fail" at the IWC for any sub-lethal endpoint measured in the test and a percent effect for that sub-lethal endpoint greater than or equal to 50 percent."

Routine monitoring test results, MMET test results, or any monitoring conducted with the most sensitive species at the IWC are used to determine whether the MDET is met. Unlike the MDEL, failure to meet the MDET is not a violation of an effluent limitation, but may result in the discharger being required to conduct a TRE.

The threshold of a 50 percent effect is included to be certain the magnitude of toxicity is high enough by itself to indicate a target is not met. The 50 percent effect threshold is consistent with the MDEL for dischargers with effluent limitations and with an LC_{50}, which is a measurement often used in toxicology to show a significant toxic effect on test organisms.

Chronic Toxicity Median Monthly Effluent Target

The MMET is similar to the MMEL, except that the MMET applies to dischargers that do not have effluent limitations for chronic aquatic toxicity and failure to meet the MMET does not result in violations. The Provisions do not include a MMET for acute toxicity. MMETs are designed to address the possible effects of a discharge over a period of a calendar month. Under this option, the MMET is based on toxicity tests, analyzed using the TST approach at the IWC. The MMET does not rely on the percent effect, but instead considers only the pass/fail analysis of the toxicity test data using the TST approach.

Whenever a non-storm water NPDES discharger does not have effluent limitations for chronic aquatic toxicity, the Regional Water Board would include the following MMET in the NPDES permit:

> "No more than one {most sensitive species} chronic aquatic toxicity test initiated in a calendar month shall result in a "fail" at the IWC for any endpoint."

If the routine monitoring test results in a pass, the MMET tests are not required in that calendar month. If the routine monitoring test results in a "fail," the discharger would be required to conduct up to two MMET tests, initiated within the same calendar month as the initial routine monitoring test that resulted in a fail. The frequency of routine monitoring tests and MMET tests are discussed in Option 1 of Issue G, in Section 5.4.4 of this Staff Report. The MMET tests would be conducted using the same test methods and species as the routine monitoring test.

The MMET is not met when two or more tests initiated in a calendar month result in a "fail" at the IWC. Similar to the MMEL, the MMET uses the median of three toxicity tests conducted within the same calendar month. Two fails within three consecutive toxicity tests, initiated within a calendar month, is a clear indication that toxicity exists in the effluent. It is statistically improbable that two out of three toxicity tests, conducted within the same calendar month would result in fails through error alone, given the low false positive rate incorporated into the TST approach (for details, please refer to Section J.5 of Appendix J).

A single toxicity test that results in fails for multiple sub-lethal endpoints (e.g., giant kelp) would not by itself result in not meeting the MMET. However, a fail for one sub-lethal endpoint in one toxicity test followed by a fail of a different sub-lethal endpoint in a subsequent toxicity test initiated within the same calendar month would result in a failure to meet the MMET.

Failure to meet the MMET is not a violation of an effluent limitation, but may result in the discharger being required to conduct a TRE. This determination is made using routine monitoring test results, MMET test results, or the results of any toxicity monitoring conducted with the most sensitive species at the IWC.

This procedure allows for ongoing routine monitoring of aquatic toxicity to ensure the protection of the environment, while providing some relief to non-storm water NPDES dischargers from conducting multiple aquatic toxicity tests each calendar month if the initial toxicity test demonstrates that their effluent is non-toxic.

Additional Monitoring

Non-storm water NPDES dischargers that are required to conduct routine monitoring at a frequency that is less than monthly could be subject to an additional routine monitoring test for TRE determination. Additional routine monitoring tests for TRE determination are discussed further in Option 1 of Issue G. These additional routine monitoring tests are necessary to determine if toxicity is persistent. If toxicity is detected in one calendar month, the additional routine monitoring test will used to assess if that toxicity persists in the following calendar month.

Undertaking a TRE

Dischargers would not need to wait until there are two violations of effluent limitations, or until targets are not met two or more times, before taking steps to identify and eliminate toxicity whenever there is an indication of toxicity in a discharge. Dischargers would have an option of taking immediate action to isolate and eliminate the toxicity whenever there is a failure to meet monitoring targets or a violation of an effluent limitation. As a result of these immediate actions, the dischargers could avoid possible further failures to meet monitoring targets or violations of effluent limitations and the need to conduct a TRE.

Comparison of Current Conditions and the Preferred Option

Under this option, for discharges with effluent limitations, routine chronic and acute toxicity tests and MMEL compliance tests would be used to determine when toxicity is persistent and when a TRE is required. For discharges without effluent limitations, target routine chronic toxicity tests and MMET tests would be used to determine when toxicity is persistent and when a TRE is required. This option would eliminate the need for dischargers to conduct accelerated monitoring tests whenever an effluent limitation or trigger is exceeded, as is currently required in many of the permits that were reviewed. Therefore, this option may result in a reduction in the number of chronic or acute toxicity tests that are required whenever an exceedance occurs.

For dischargers with effluent limitations, the approach for determining when a TRE is required in this option is based on two or more MMEL and/or MDEL violations within a single calendar month or consecutive calendar months. For dischargers without effluent limitations, the approach for determining when a TRE is required in this option is based on a failure to meet the MMET and/or MDET two or more times within a single calendar month or consecutive calendar months. In the permits reviewed, a fail or an exceedance requires the discharger to conduct a series of accelerated monitoring tests, which are generally four tests conducted over an eight-week period. If one of the accelerated monitoring tests results in a fail, or exceeds a trigger or limit, the discharger is required to conduct a TRE. In the permits reviewed, a TRE may be required when a discharger has two fails or exceedances, one for a routine monitoring test and another for an accelerated monitoring test. These approaches are similar and use analogous considerations to determine that toxicity is persistent and may be causing or contributing to toxicity in the receiving water. However, it is not known if the differences between the approach in this option and the approaches in existing permits would result in a greater or lesser number of TREs.

Advantages and Disadvantages

This option would not require dischargers to conduct a series of potentially costly accelerated monitoring tests to determine if toxicity is persistent, as described in Option 2. Avoiding accelerated monitoring tests could potentially lead to cost savings for dischargers as accelerated monitoring tests may be expensive and each test may be subject to additional violations.

A possible disadvantage of this option is that it may take up to two months to determine the presence of persistent toxicity and trigger a required TRE. As a result of waiting until there are two effluent limitation violations or a failure to meet targets twice, the start of a TRE process could be delayed. However, under most of the current permits that were reviewed, an accelerated monitoring process may take up to eight weeks before determining that a discharger is required to conduct a TRE.

Option 2: Require accelerated monitoring for TRE determination.

Similar to Option 1, a TRE would be required for dischargers whenever there is evidence of persistent toxicity. To determine if toxicity is persistent, whenever a discharger has a MDEL or MMEL violation for chronic or acute toxicity, or fails to meet the MDET or MMET for chronic toxicity the discharger would be required to conduct a series of accelerated monitoring tests in accordance with a TRE determination monitoring schedule.

A TRE determination monitoring schedule would consist of four chronic or acute toxicity tests, conducted at a maximum of 10-day intervals, over a period of 45 days. If any of the TRE determination monitoring tests were to result in a fail at the IWC, the discharger would be required to initiate a TRE, and any further accelerated monitoring tests would be waived. The TRE would be in accordance with a TRE Workplan approved by the Regional Water Board.

This option would provide a consistent statewide method for determining when a TRE is required, helping to achieve the goal of regulatory uniformity. Accelerated monitoring provides a quick response to any MDET or MMET non-attainment or MMEL or MDEL violation and ensures that a TRE is initiated whenever the presence of toxicity is discovered in an effluent. This option could result in significant costs to dischargers for conducting accelerated monitoring. In addition, each accelerated monitoring tests would be subject to potential MMEL and MDEL violations. Whenever a discharger is conducting accelerated monitoring in accordance with a TRE determination monitoring schedule, it may be difficult to separate routine monitoring from accelerated monitoring tests.

Option 3: No Action

If no action is taken, the existing requirements in Section 4 of the SIP would be maintained and TRE requirements would not be included in these Provisions. Existing TRE requirements in Section 4 of the SIP obligate dischargers to conduct a TRE, "[i]f a discharge causes or contributes to chronic toxicity in a receiving water body…" However, the SIP does not identify how to make this determination. Regional Water Boards would still need to determine if a discharge contributes to chronic toxicity in a receiving water body. This gives the Regional Water Boards discretion to determine if a TRE is needed or not.

The advantage of this option is that it affords a great deal of flexibility to the Regional Water Boards. The disadvantage is that different Regional Water Boards may come up with differing approaches, such as accelerated monitoring, or a certain number of violations over a given time period to assess when a discharge is causing or contributing to toxicity in the receiving water body. As a result, certain facilities may have more economic advantages than other similar facilities while lenient compliance provisions and deadlines may weaken protections for aquatic biota. This option fails to meet the goal of establishing statewide consistency.

5.5 Storm Water Dischargers

5.5.1 Issue J. What should be required of storm water dischargers?

Current Conditions

Clean Water Act section 402, subdivision (p), (33 U.S.C. §1342(p).) and Water Code section 13263 and 13377 authorize the Water Board to issue individual and general NPDES permits for storm water discharges. There are a few categories of storm water discharge including, industry, construction, or municipal separate storm sewer systems (MS4s). Municipalities serving between 100,000 and 250,000 people are required to apply for Phase I MS4 permits, while smaller municipalities and non-traditional permittees (i.e., typically state or federal facilitates) are enrolled in the statewide general Phase II MS4 permit. Storm water discharges arising from projects carried out by the California Department of Transportation (Caltrans) are regulated under a statewide Phase I MS4 permit known as the Statewide Storm Water Permit for the State of California Department of Transportation or the Caltrans MS4 Permit NPDES No. CAS000003. Construction projects that disturb one or more acres of soil are required to enroll in the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit or CGP). A defined set of industrial dischargers are required to enroll in the General Permit for Storm Water Discharges Associated with Industrial Activity (Industrial General Permit or IGP). Also, individual permits are issued to dischargers that request an individual permit, are ineligible for the general permit or are required by the Regional Water Board to have an individual permit.

NPDES storm water permits include toxicity receiving water limitations, monitoring, and reporting requirements in varying degrees. For example, MS4 dischargers are required to control pollutants to the maximum extent practicable (MEP) using structural and nonstructural mitigation measures known as “management practices” or “best management practices” (BMPs). Industrial General Permit dischargers are required to control toxicants released from their facilities using the “best available technology economically achievable” and the “best conventional pollutant control technology” (i.e., BAT/BCT). Dischargers of storm water associated with construction and land disturbance activities are required to conduct acute toxicity testing whenever an active treatment system is used.

There are no statewide implementation requirements for storm water dischargers related to aquatic toxicity monitoring and control. However, most of the MS4 permits include requirements for routine aquatic toxicity monitoring for the receiving waters. Those MS4 permits that have routine monitoring requirements also require dischargers to use the test methods and species that are included in Table 1 of the Provisions. In addition, some MS4 permits require the discharger to use the TST approach to analyze the toxicity test data.

There are no requirements in either the IGP or the CGP that requires dischargers to conduct aquatic toxicity testing. However, some dischargers enrolled in the IGP and the CGP have conducted some site-specific aquatic toxicity test for chronic or acute aquatic toxicity.

The Caltrans MS4 Permit requires dischargers to monitor for chronic toxicity for samples collected from outfalls that are equal to or greater than 36 inches in diameter. Such dischargers must also analyze for chronic toxicity with all TMDL related monitoring.

Issue Description

Storm water is defined by US EPA as the runoff generated when precipitation from rain and snowmelt events flows over land or impervious surfaces without percolating into the ground. Storm water is often considered a nuisance because it mobilizes pollutants such as motor oil, toxic metals, pesticides, and other substances that are toxic to aquatic environments. In most cases, storm water flows directly to water bodies through sewer systems, contributing a major source of pollution to rivers, lakes, and the ocean. Storm water discharges in California are regulated through National Pollutant Discharge Elimination System (NPDES) permits.

Presently, only some storm water dischargers are required to conduct toxicity monitoring, and these monitoring requirements vary among permits and/or dischargers.

A variety of statistical approaches may be used to interpret toxicity test data from storm water discharges. Inconsistencies between Water Boards often complicate the data analysis step, as some current statistical approaches require complex data interpretations. Using a statewide statistical approach for all storm water dischargers across the Water Boards would ensure appropriate and consistent data analysis.

In addition, if a statewide chronic and acute water quality objective is selected, as considered in Issue A, the statistical approach should be compatible with the water quality objective.

Options

Option 1 - Preferred: Require storm water dischargers to use the TST approach when appropriate

This option would not require mandatory toxicity testing or effluent limitations for storm water dischargers. The Water Board would have discretion whether to require stormwater dischargers to conduct aquatic toxicity monitoring or to include effluent limitations in permits. However, for storm water dischargers who are required to be enrolled in NPDES permits, if the Water Boards require chronic and/or acute toxicity testing, using test methods as described in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions, then the TST approach would be required for analyzing the resulting data generated from the acute or chronic toxicity tests.

For those dischargers with existing chronic or acute toxicity monitoring requirements, Water Code section 13267 or 13383 orders would need to be issued by the Regional Water Boards within one year from the effective date of the Provisions. These Water Code section 13267 or 13383 orders would require the use of the TST approach for data analysis, if the required tests methods and species are those in Table 1 of the Provisions, within one year from the postmarked date of the order. Likewise, if the Water Boards requires test methods and species in Table 1 after the effective date of these provisions, then the TST would be required for data analysis. Results obtained from each toxicity test would need to be reported to the Regional Water Board as either a pass or a fail, as determined using the TST approach, along with the percent effect at the IWC.

Although the Provisions do not supersede TMDLs established prior to the effective date of the Provisions, if any specific aquatic toxicity requirements in the Provisions is as protective or more protective than any specific aquatic toxicity TMDL requirement, then the comparable requirement of the Toxicity Provisions shall apply. Some TMDLs include targets or waste load allocations which are based on a statistical approach other than the TST. For these TMDLs, the Regional Water Board could include effluent limitations or receiving water limitations using Table 1 species and a statistical approach other than the TST only if the Regional Water Board makes a finding that the TMDL based requirement is more protective than the comparable requirement in the Provisions.

Typically, toxicity testing for storm water would consist of comparing a single concentration of 100 percent ambient water or storm water runoff at a particular location to a control, unless specified otherwise by the Regional Water Board or by law.

The Provisions would not prohibit the Water Boards from using test methods and species that are not listed in Table 1 of the Provisions. Using other test methods and species would be at the discretion of the Water Boards. Some non-Table 1 species are more sensitive to certain toxicants than those listed in Table 1. Retaining the option to use these species provides protection to waters where these types of toxicants exist. For example, the municipal regional storm water NPDES permit for the San Francisco Bay Region (Order No. R2-2015-0049) requires storm water dischargers to conduct toxicity tests using *C. dilutus*, which are more sensitive to neonicotinoid pesticides.

Comparison of Current Conditions and the Preferred Option

Currently storm water NPDES permits with toxicity monitoring requirements do not have a uniform statistical approach to analyze toxicity data. Requiring the use of the TST approach would create consistency between permits and allow for easier data interpretation. This option does not require mandatory toxicity testing for storm water dischargers. Therefore, adoption of this option would not result in a change in chronic or acute toxicity testing for storm water dischargers. The Water Boards would continue to have discretion to require, or not require, chronic and/or acute toxicity testing for storm water dischargers on a permit-by-permit basis. As discussed in option 1 of Issue C, although the TST approach is an improved statistical approach that provides greater confidence in the outcomes than traditional approaches being used. Use of the TST approach is not anticipated to result in a significant increase in the number of exceedances.

Advantages and Disadvantages

This option would still allow the Water Boards to require chronic and/or acute toxicity monitoring using other toxicity test methods and species that are not included in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions. Such toxicity test methods may be necessary to test for certain pesticides or chemicals where test species in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions either are not as sensitive to a particular toxicant of concern, or do not represent a good surrogate to protect resident species.

Although the implementation requirements in the Provisions are not as prescriptive for storm water dischargers as they are for non-storm water NPDES dischargers, the numeric water quality objectives in the Provisions would apply to all inland surface waters, enclosed bays, estuaries, and coastal lagoons no matter the type of dischargers that discharge to that water. All dischargers, including storm water dischargers, would be responsible for ensuring that their discharge does not cause or contribute to an exceedance of the aquatic toxicity water quality objectives or impair aquatic life beneficial uses in the receiving water. In addition, the Water Boards can utilize the numeric water quality objectives in conjunction with programs designed to protect water quality from storm water, such as the Strategy to Optimize Resource Management of Storm Water (STORMS) to develop implementation requirements specific to storm water, or to develop statewide implementation requirements.

While this option would not establish a statewide storm water monitoring program for the protection of aquatic life, the use of the TST approach is expected to improve toxicity data interpretation which would, in turn, enable the Water Boards to appropriately address toxic events. Using the same statistical approach for analyzing toxicity test data will also help improve statewide data analysis and reporting.

Option 2: Require toxicity numeric effluent limitations for NPDES storm water dischargers with reasonable potential

This option would require the Water Boards to include toxicity numeric effluent limitations in NPDES storm water permits where there is reasonable potential. Should reasonable potential exist, storm water dischargers would be required to implement a routine monitoring program.

The application of numeric toxicity effluent limitations for storm water dischargers could help reduce the effects of toxicity in storm water runoff; however, the inclusion of numeric effluent limitations in storm water permits may be inappropriate given the diffuse nature of storm water runoff and the challenges faced by storm water dischargers in controlling pollutants in such diffuse discharges. Under federal law, industrial storm water discharges must meet the requirements of Clean Water Act section 301, including the requirements for effluent limitations. With regard to municipal storm water, under federal law, an MS4 permit must include “controls to reduce the discharge of pollutants to the maximum extent practicable . . . and such other provisions as . . . the State determines appropriate for the control of such pollutants.” (Clean Water Act §402(p)(3)(B)(iii).) Pursuant to this provision, the permitting agency may determine that requirements to meet water quality standards through effluent limitations are appropriate. (Defenders of Wildlife v. Browner (9th Cir. 1999) 191 F3d 1159.)

Industrial and construction storm water permits have generally required compliance with receiving water limitations (i.e., the requirement not to cause or contribute to an exceedance of water quality standards in the receiving water) and implemented that compliance through end- of-pipe numeric action levels (NAL), which, if exceeded, require additional control measures to be implemented. Municipal storm water permits have also required compliance with receiving water limitations and have generally relied on management practice implementation requirements for achieving that compliance.

Between 2005 and 2006, the State Water Board convened a panel of experts to examine the use of numeric effluent limits in storm water permits. The recommendations made by the panel to the Waterboard were reported in The Feasibility of Numeric Effluent Limits Applicable to Dischargers of Storm Water Associated with Municipal, Industrial and Construction Activities (Currier et al., 2006). The panel identified several drawbacks to the BMP-based regulatory approach, including a lack of management practice review and evaluation, maintenance concerns, and the difficulty in identifying factors contributing to beneficial use impairment. The panel nevertheless concluded that it was not feasible, at that time, to set enforceable numeric effluent limitations for municipal storm water discharges. The panel determined numeric limits to be feasible for some storm water dischargers, provided a more appropriate method of industry classification is established in addition to a reliable database detailing emissions and management practice performance (Currier et al., 2006). This database has not been established and doing so would require a significant amount of the Water Boards' resources and would likely take several years to complete.

However, the question of whether it is appropriate to impose numeric effluent limitations on municipal storm water discharges has continued to evolve, especially in the context of implementing TMDL WLAs. In 2014, US EPA issued a memorandum that noted the increased information available to the permitting agencies after more than a decade of experience with setting waste load allocations (WLA) and effluent limitations and proposed that numeric waste load allocations should be translated into effective, measurable effluent limitations that will achieve standards including, where appropriate, numeric effluent limitations (U.S. EPA 2014b). An example of this is the *Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4* (Order R4-2012-0175), which incorporates some numeric effluent limitations for discharges of toxic pollutants to water bodies with TMDLs addressing toxicity.

While the issue of the appropriateness of numeric effluent limitations for storm water discharges continues to evolve, at this stage in the regulation of storm water it is inappropriate to impose a blanket requirement for chronic toxicity effluent limitations for all such discharges. There are significant difficulties associated with numeric effluent limitations calculations and compliance monitoring. While a compliance schedule would aid implementation efforts, the highly variable nature of storm water, coupled with the multitude of point sources within a municipality, continues to caution against a blanket policy of imposing numeric effluent limitations.

Option 3: Require prescriptive monitoring requirements for storm water dischargers

This option would require the Water Boards to include a toxicity monitoring program for NPDES storm water dischargers. This approach would afford permit writers flexibility when developing follow-up measures required for compliance with the proposed objectives.

Implementation of this monitoring program would be divided into two stages. In the first stage, the Water Boards would issue Water Code section 13267 or 13383 orders requiring dischargers that are subject to toxicity monitoring requirements to monitor and report toxicity results using the TST approach for all toxicity data within one year of the letter's postmarked date. Water Code section 13267 or 13383 orders would not be issued to dischargers that are not subject to toxicity monitoring requirements on the effective date of the Provisions. Such dischargers would be exempt from this monitoring and reporting requirement for the remainder of their current NPDES permit, which are reissued on a 5-

year cycle. Permits that are issued, reissued, or reopened after the effective date of the Provisions would include toxicity monitoring requirements, which is the second stage of implementation.

The monitoring programs would, at a minimum, require each discharger to conduct four chronic or acute toxicity tests per year throughout the term of the NPDES permit, if sufficient storm water runoff is available. One test would be required using samples from the first storm event of the wet season, if practicable. A second test would be required using samples from a subsequent storm event. The other two tests would be conducted using dry season samples, if practicable. Toxicity test results would be analyzed using the TST approach. The Water Boards would have the discretion to issue compliance schedules to dischargers to provide more time for implementation of a toxicity monitoring program.

Apart from improving toxicity data interpretation by using the TST approach, this option provides two additional benefits. First, a statewide toxicity monitoring program for urban runoff will ensure that all municipalities and industries are assessing the environmental impact of their storm water discharges and taking appropriate action when necessary. Such an approach provides a feasible alternative to numeric toxicity effluent limitations and may increase protections for aquatic life beneficial uses. Second, minimum monitoring requirements allow the Water Boards to consider site-specific remediation plans for municipal and industrial storm water dischargers. This monitoring framework could also be applied to storm water discharges from construction and industrial sites subject to the respective CGP and IGP. This option would not preclude the Water Boards from establishing numeric effluent limitations for toxicity in Phase I and II MS4 permits, and industrial storm water permits if deemed appropriate.

This option has the potential for storm water discharges to be under protective of aquatic life beneficial uses. Permits without best management practice design requirements may result in unsatisfactory or inappropriate abatement measures, and the omission of management practice performance standards could lead to poor maintenance and neglect. In addition, dischargers may have difficulty determining the source of toxicity in storm water runoff if clear and concise TRE requirements are omitted from NPDES permits. Lastly, a mandatory monitoring program may prove to be economically burdensome to municipalities that are not currently required to conduct toxicity tests.

Option 4: No action

Under this option, the Water Boards would continue to establish toxicity monitoring, assessment, and reporting requirements for storm water dischargers, at their discretion. While this option would not resolve the regulatory inconsistencies that exist among the various municipal and industrial NPDES permits, it would enable the Water Boards to continue establishing site-specific and discharger-specific monitoring requirements. This approach affords a high degree of flexibility to the Water Boards. However, dischargers may continue to use varying statistical approaches to analyses toxicity data, making statewide reporting and assessment more difficult.

5.6 Nonpoint Source Dischargers

5.6.1 Issue K. What should be required of nonpoint source dischargers?

Current Conditions

The existing policy for nonpoint sources is the State Water Board's *Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (Nonpoint Source Policy, State Water Board 2004). The Nonpoint Source Policy explains how the *Plan for California's Nonpoint Source Pollution Control Program* (NPS Pollution Control Program, State Water Board 1999) is implemented and enforced in fulfillment of the requirements of California Water Code, section 13369 (a)(2)(B). As indicated in the Nonpoint Source Policy, the most successful control of nonpoint sources is achieved by preventing or minimizing the generation of nonpoint source discharges, and is typically conducted through the implementation of management practices.

Presently there are no statewide toxicity requirements for nonpoint source dischargers. However, pursuant to California Water Code sections 13260, 13263 and 13269, and the Nonpoint Source Policy (2)(c), all current and proposed nonpoint source discharges must be regulated, by one or a combination of administrative tools, that include WDRs, Waivers of WDRs, or prohibitions. The San Francisco, Central Coast, Los Angeles, Central Valley, Santa Ana, Colorado River, and San Diego Regional Water Quality Control Boards have adopted WDRs or waivers to address agricultural runoff. The North Coast Regional Water Board is in the development phase of a WDR for discharges associated with agriculture. In addition, all the Water Boards have WDRs or waivers of WDRs that address a variety of non-point source discharges.

Discharge permit requirements specify monitoring of non-point sources discharges such as agricultural runoff, road projects, grazing allotments, and post fire recovery projects. They may also specify the development and implementation of more rigorous management plans and practices to minimize pollutants found in nonpoint source runoff. Across the nine Regional Water Boards there are significant differences in the regulatory approaches for irrigated agriculture and other nonpoint sources. Some of these differences can be attributed to varying water quality threats posed by the disparate agricultural operations, or other nonpoint sources around the state. Other differences can be explained by the need for more stringent requirements to protect vulnerable or impaired receiving waters.

WDRs issued for agriculture and other nonpoint sources typically include a monitoring program for contaminants that may come from these various nonpoint sources. Some WDR monitoring programs include periodic acute and/or chronic aquatic toxicity monitoring requirements.

Generally, 40 CFR Part 136 test methods and species are used because laboratories are familiar with these species and test methods and are equipped for their use.

Issue Description

Runoff from nonpoint sources is a significant source of water pollution in California and the U.S. Pollution from nonpoint sources originates primarily from land use activities such as those associated with agriculture, silviculture, and hydromodification, and is generally transported via rainfall, snowmelt, and irrigation water. Agricultural operations are one of the primary sources of nonpoint source pollution in California, contributing to the impairment of approximately 16,865.5 miles of rivers, and streams; 696.2 acres of lakes, ponds, and reservoirs; 91.7 square miles of bays and estuaries; and 115 acres of wetlands (USEPA 2013). Chronic and acute toxicity has also been directly linked to pesticide in agricultural runoff (Anderson et al. 2003a; Anderson et al 2003b; Anderson et al. 2006). It is appropriate to consider the ways by which the Provisions may improve the consistency of toxicity requirements for nonpoint source dischargers.

Options

Option 1 - Preferred: Require nonpoint source dischargers to use the TST approach when appropriate

This option would not require mandatory toxicity testing for nonpoint source dischargers. However, if the Water Boards determines that chronic and/or acute toxicity testing is required, for a nonpoint source discharger, using test methods as described in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions, then the TST approach would be required for analyzing the resulting data generated from the acute or chronic toxicity tests.

For those dischargers with existing toxicity monitoring requirements, Water Code section 13267 orders would need to be issued by the Regional Water Boards within one year from the effective date of the Provisions. These Water Code section 13267 orders would require the use of the TST approach for data analysis, when using test species included in Table 1 of the Provisions, within one year from the postmarked date of the order. Likewise, if the Regional Water Board requires toxicity testing using test methods and species in Table 1 after the effective date of these provisions, then the discharger would be required to analyze the data using the TST.

Although the Provisions do not supersede TMDLs established prior to the effective date of the Provisions, if any specific aquatic toxicity requirements in the Provisions is as protective or more protective than any specific aquatic toxicity TMDL requirement, then the comparable requirement of the Toxicity Provisions shall apply. Some TMDLs include targets or waste load allocations which are based on a statistical approach other than the TST. For these TMDLs, the Regional Water Board could include effluent limitations or receiving water limitations using Table 1 species and a statistical approach other than the TST only if the Regional Water Board makes a finding that the TMDL based requirement is more protective than the comparable requirement in the Provisions.

Results obtained from each toxicity test would need to be reported to the Regional Water Board as either a pass or a fail, as determined using the TST approach, along with the percent effect at the IWC. Dischargers that are not required to conduct routine toxicity monitoring or that use test methods other than those included in Section III.B.2 (formerly

Section IV.B.1.b) of the Provisions, would not be required to analyze the data using the TST.

Comparison of Current Conditions and the Preferred Option

Presently, there are no statewide toxicity requirements for nonpoint source dischargers. All Water Boards have WDRs or conditional waivers of WDRs that address a variety of non-point source discharges, and some WDR monitoring programs include periodic acute and/or chronic aquatic toxicity monitoring requirements. WDRs with toxicity monitoring requirements do not have a uniform statistical approach to analyze toxicity data. Requiring the use of the TST approach would create consistency between programs and allow for easier data interpretation. This option does not require mandatory toxicity testing for nonpoint source dischargers.

Therefore, adoption of this option would not result in a change in chronic or acute toxicity testing for nonpoint source dischargers. The Water Boards would continue to have discretion to require, or not require, chronic and/or acute toxicity testing for nonpoint source dischargers on a case-by-case basis. As discussed in option 1 of Issue C, although the TST approach is an improved statistical approach that provides greater confidence in the outcomes than traditional approaches being use, use of the TST approach is not anticipated to result in a significant increase in the number of exceedances.

Advantages and Disadvantages

This option would still allow the Water Boards to require chronic and/or acute toxicity monitoring using other toxicity test methods and species that are not included in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions. Such toxicity test methods may be necessary to test for certain pesticides or chemicals where test species in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions either are not as sensitive to a particular toxicant of concern or do not represent a good surrogate to protect resident species.

Although the implementation requirements in the Provisions are not as prescriptive for nonpoint source dischargers as they are for non-storm water NPDES dischargers, the numeric water quality objectives in the Provisions would apply to all inland surface waters, enclosed bays, estuaries, and coastal lagoons no matter the type of dischargers that discharge to that water. All dischargers would be responsible for ensuring that their discharge does not cause or contribute to an exceedance of the aquatic toxicity water quality objectives or impair aquatic life beneficial uses in the receiving water. In addition, the Water Boards can utilize the numeric water quality objectives in conjunction with programs designed to protect water quality from nonpoint sources, such as the ILRP to develop implementation requirements for specific storm water and nonpoint source dischargers, or to develop statewide implementation requirements

While this option would not establish a statewide monitoring program for the protection of aquatic life, the use of the TST approach is expected to improve toxicity data interpretation which would, in turn, enable the Water Boards to appropriately address toxic events. Using the same statistical approach for analyzing toxicity test data will also help improve statewide data analysis and reporting.

Option 2: Require Waste Discharge Requirements and Conditional Waivers of Waste Discharge Requirements for nonpoint source dischargers to include numeric effluent limitations for chronic toxicity

Under this option, the Water Boards would impose effluent limitations for chronic toxicity on all nonpoint source programs regulated under WDRs or conditional waiver of WDRs. This option would also include a prescriptive monitoring program for nonpoint source dischargers. The Regional Water Boards would assign monitoring frequency to nonpoint source dischargers based on the degree of impact from the nonpoint source discharge and the degree of impairment in the receiving water. Nonpoint source dischargers would also be required to use the toxicity test methods and species included in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions for routine monitoring and use the TST approach for data analysis.

This option would require the Regional Water Boards to update existing WDRs and waivers of WDRs to incorporate chronic toxicity effluent limitations and routine monitoring requirements. Numeric limitations would establish a compliance-driven approach to toxicity control and provide nonpoint source dischargers with further incentive to reduce toxicity. However, the inclusion of numeric effluent limitations in nonpoint source WDRs or waivers of WDRs is likely unsuitable given the diffuse nature of nonpoint source runoff and the current strategy of addressing pollutants by implementing management practices.

Option 3: Require prescriptive monitoring requirements for nonpoint source dischargers

This option would require the Water Boards to include a toxicity monitoring program in all nonpoint source WDRs, conditional waivers of WDRs, or prohibitions. Nonpoint source dischargers would also be required to use the toxicity test methods and species included in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions for routine monitoring and use the TST approach for data analysis. This approach would afford permit writers greater flexibility when developing follow-up measures required for compliance with the proposed objectives.

A minimum of four toxicity tests would be required during each year of the WDR, waiver of WDR, or prohibition cycle. These toxicity tests would be spread out evenly throughout each year, to the extent practicable. The Water Boards would determine sampling times and locations, as well as the management practices, oversight procedures, compliance schedules, and remediation measures to be employed by the nonpoint source (NPS) discharger.

Implementation of this monitoring program would be divided into two stages. Within one year from the effective date of the Provisions, the Water Boards would issue Water Code section 13267 orders to all NPS dischargers that are required to conduct toxicity monitoring. One year from the order's postmarked date, these NPS dischargers would be required to use the toxicity test methods in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions to conduct aquatic toxicity tests and use the TST approach to analyze the resulting test data.

Within two years from the effective date of the Provisions, the Water Board would issue Water Code section 13267 orders to all NPS dischargers that are not required to conduct toxicity monitoring. One year from the order's postmarked date, these NPS dischargers would be required to conduct routine toxicity monitoring, use the toxicity test methods in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions, and use the TST approach.

The use of the TST approach would improve and simplify data interpretation, while specific monitoring requirements would facilitate regulatory consistency. In addition, the Water Boards would retain the authority to establish numeric limitations as deemed appropriate. However, this option has the potential to be less protective because minimum requirements for management practices, oversight procedures, and remediation measures for toxicity may or may not be specified in a WDR, conditional waiver of WDRs, or prohibition. In addition, the species listed in Table 1 of the Provisions may not be the most appropriate species for certain types of pesticides or other constituents from nonpoint sources. Requiring NPS dischargers to only use test species listed in Table 1 of the Provisions, may be less protective than allowing the use of other test species that are more sensitive to common pesticides or constituents that are prevalent in a watershed.

Option 4: No action

Under this option, the Water Boards would continue to establish toxicity monitoring, assessment, and reporting requirements for individual WDRs, waivers of WDRs, and prohibitions, at their discretion. Such omissions fail to address the Provisions' goal of regulatory consistency. Dischargers may continue to use varying statistical approaches to analyze toxicity data, making statewide reporting and assessment more difficult.

5.7 Other Issues Considered

State Water Board staff identified and considered several other possible issues related to the Provisions, but have decided to not include a range of options because no change would be made to existing policies and requirements, or the changes would be minor. The other issues considered were compliance schedules, flow-through acute toxicity systems, additional monitoring, exemptions for insignificant dischargers, biological pesticide and residual pesticide dischargers, drinking water system discharges, and natural gas facility discharges, and variances and exemptions to the toxicity water quality objectives.

5.7.1 Consideration of Compliance Schedules

Compliance schedules are a discretionary regulatory tool for bringing NPDES dischargers into compliance with new, revised, or newly interpreted water quality objectives, without being in violation of their permits. The purpose is to give dischargers time to make necessary changes in facilities or operations to comply with new, or more stringent, water quality-based permit limitations without subjecting the discharger to enforcement proceedings. Compliance schedules are included in the discharger's permit and lay out the enforceable sequence of actions or operations the discharger will take to comply as rapidly as possible.

The Provisions do not change the State Water Board's current compliance schedule policy, adopted under Resolution No. 2008-0025. Under this policy, the Water Boards may allow up to 10 years if the conditions specified in the Compliance Schedule Policy are met. Compliance schedules must be as short as possible and can only go beyond 10 years if approved through a single permit action or a TMDL. Regional Water Boards would have the discretion to include a compliance schedule in non-storm water NPDES permits after the effective date of the Provisions. Such a compliance schedule may be necessary to allow discharges to come into compliance with the Provisions if they currently do not have effluent limitations, or if their effluent limitations in their current NPDES permits are less stringent than the effluent limitations in the Provisions. However, since many non-storm water NPDES dischargers in California are already required to comply with some form of an effluent limitation for aquatic toxicity, it is not anticipated that compliance schedules will be necessary for many non-storm water NPDES dischargers.

5.7.2 Consideration of Flow-Through Acute Toxicity Testing Systems

A flow-through acute toxicity test system is a toxicity testing system where test species are exposed to a continuous flow of effluent. Such systems are able to measure real time acute effects of effluent on test species. Therefore, they can be useful in identifying potential acute effects from effluent rather quickly. However, these systems generally use trout or other species of fish that may not be the most sensitive species available to monitor the potential acute effects from the effluent.

The Water Boards would retain the discretion to include additional toxicity compliance requirements in NPDES permits specific to existing flow-through acute toxicity systems. These additional requirements could include effluent limitations and/or monitoring requirements. Any such requirements would be in addition to the Provisions and could not be substituted to meet the acute toxicity monitoring requirements in the Provisions. Flow-through monitoring can be helpful in assessing if a discharger's toxicity controls are effective in preventing or controlling toxicity in their effluent with more immediate, real-time results than static monitoring.

For existing flow-through systems that are amenable to the use of the TST approach, the Water Boards should require the use of the TST approach. However, for existing flow-through systems that are not amenable to the TST approach, the Regional Water Board would specify the statistical approach, or calculation that must be used. Examples of approaches that may be used to analyze acute toxicity data from a flow though system include using a t-test statistical approach or a percent survival calculation. If the Water

Boards require the construction of flow-through systems after the effective date of the Provisions, the flow through system would need to be designed and constructed in such a way that would allow the use of the TST approach. Once constructed this way, these dischargers would be required to use the TST approach.

5.7.3 Consideration of Additional Monitoring

Under the Provisions, in addition to effluent limitation compliance monitoring and monitoring specific to flow-through acute toxicity testing systems, the Water Boards would have the option to require dischargers to conduct additional toxicity testing. This testing can include, but is not limited to special studies, additional test species, testing with additional dilutions or higher concentrations of effluent than the IWC, or using test species not included in Table 1 of Section III.B.2 (formerly Section IV.B.1.b) of the Provisions. The Water Boards can require this testing in an NPDES permit or a Water Code section 13383 Order. The rationale for requiring additional monitoring must be documented in the NPDES fact sheet (or equivalent document) or Water Code section 13383 Order.

The Water Boards must specify in the permit the specific type of testing (e.g., the most sensitive species and the concentration of the IWC) that will be used to determine compliance with the MDEL and MMEL. To the extent any of the additional monitoring described above requires the use of receiving water, different test methods or species than in Table 1 of the Provisions, or different effluent concentrations than the IWC, that additional monitoring cannot be used to determine compliance with the numeric toxicity effluent limitations specified in Sections III.C.5 and III.C.6 (formerly Sections IV.B.2.e and IV.B.2.f) of the Provisions.

5.7.4 Consideration of Insignificant Dischargers

Under the Provisions, the Regional Water Boards may exempt certain non-storm water NPDES dischargers, which are determined to be insignificant dischargers, from some or all of the implementation requirements. Insignificant Dischargers are NPDES dischargers that are determined by the Water Boards to be very low threats to water quality. Examples of insignificant dischargers may include, but is not limited to, small non-continuous dischargers and once through cooling dischargers

To allow such an exemption the Regional Water Board must first make a finding that an insignificant discharger will have no reasonable potential to cause or contribute to an exceedance of the numeric aquatic toxicity water quality objectives. In making such a finding the Regional Water Board would not need to use the procedures in the Provisions for determining reasonable potential, but would need to look at water body and discharger specific information.

After making such a finding, the Regional Water Board would then determine if an insignificant discharger must still meet some of the implementation requirements to protect the receiving water, or if they are exempt from all of the implementation requirements in the Provisions. The Regional Water Board could also require an insignificant discharger to conduct routine monitoring as necessary. The monitoring frequency could not exceed the monitoring frequencies as required by Section III.C.4.b.i(A) (formerly Section IV.B.2.d.ii.(A)(1)) of the Provisions.

If an insignificant discharger is exempted, the Regional Water Board would still need to include the water quality objectives of the Provisions as receiving water limitations in the NPDES permit.

5.7.5 Consideration of Biological Pesticide and Residual Pesticide Dischargers

Under the Provisions, biological and residual aquatic pesticide discharges to waters of the United States, including discharges regulated under the statewide general permits, Order No. 2016-0039-DWQ (Vector Control), 2013-0002-DWQ (Algae and Aquatic Weed Control), 2011-0004-DWQ (Spray Applications), and 2011-0003-DWQ (Aquatic Animal Invasive Species Control) would be exempt from some or all of the implementation requirements contained in Section III.C (formerly Section IV.B.2) of the Provisions. When it is infeasible to establish numeric effluent limitations for the biological pesticide or residual pesticide discharges, the Water Board may exempt that discharge from some or all of the requirements contained in Section III.C (formerly Section IV.B.2) of the Provisions, including the inclusion of numeric effluent limitations. Aquatic pesticide discharges used for vector control, algae and aquatic weed control, spray applications, and aquatic animal invasive species control have specific requirements listed in the NPDES permits to prevent harm or adverse impacts on non-target organisms and beneficial uses. If residues from aquatic pesticides cause toxicity or add to an existing toxicity, best management practices or alternatives to the pesticide causing toxicity are required. If exempted from some or all of the Provisions, the Water Board would still include the water quality objectives in Section II.C (formerly Section III.B.2) of the Provisions as receiving water limitations in the NPDES permit. The determination for the exemption must be documented in the NPDES fact sheet (or equivalent document).

5.7.6 Drinking Water System Discharges

Under the Provisions, potable drinking water dischargers would be exempt from some or all of the implementation requirements in Section III.C (formerly Section IV.B.2) [note: the December 2020 version incorrectly identified this reference as to Section IV.B.] of the Provisions. Short-term or seasonal planned and emergency (unplanned) discharges resulting from a water purveyor's essential operations and maintenance activities must comply with existing NPDES permitting requirements. Additionally, the contaminant of concern, chlorine, has specific monitoring requirements included in the NPDES permit that controls for such toxicity.

To allow such an exemption the permitting authority must first make a finding that the discharger will have no reasonable potential to cause or contribute to an exceedance of the numeric aquatic toxicity water quality objectives, or that reasonable potential exists only due to discharges of chlorine and chlorine effluent limitations are included in the NPDES permit. In making such a finding the permitting authority would not need to use the procedures in the Provisions for determining reasonable potential, but would need to consider water body and discharger specific information. The finding would be made during the permit issuance, reissuance, renewal, or reopening process.

If exempted, the Water Board would still include the water quality objectives in Section II.C (formerly Section III.B.2) of the Provisions as receiving water limitations in the NPDES permit. The Water Board could require a water purveyor to conduct routine monitoring as necessary.

Discharges likely to be eligible for this exemption include those currently covered by the *Statewide NPDES Permit for Drinking Water System Discharges to Waters of the United States* (Order WQ 2014-0194-DWQ, General Order No. CAG140001), although eligibility would be determined by the permitting authority (in this case, the State Water Board) at the time of the renewal of the general permit.

5.7.7 Discharges from Natural Gas Utility Construction, Operations and Maintenance Activities

Under the Provisions, discharges from hydrostatic testing of natural gas facilities and discharge from site dewatering related to excavation, construction, testing, maintenance, and/or repair of natural gas facilities regulated by an NPDES permit (Order No. 2017-0029-DWQ) would be exempt from some or all of the implementation requirements in Section III.C (formerly Section IV.B.2) [note: the December 2020 version incorrectly identified this reference as to Section IV.B.] of the Provisions. Discharges related to excavation, construction, testing, maintenance, and/or repair activities must comply with existing NPDES permitting requirements. Additionally, the contaminant of concern, chlorine, has specific monitoring requirements included in the NPDES permit that controls for such toxicity.

To allow such an exemption the Water Board must first make a finding that the discharger will have no reasonable potential to cause or contribute to an exceedance of the numeric aquatic toxicity water quality objectives, or that reasonable potential exists only due to discharges of chlorine and chlorine effluent limitations are included in the NPDES permit. In making such a finding, the Water Board would not need to use the procedures in the Provisions for determining reasonable potential, but would need to look at water body and discharger specific information. If exempted, the Water Board would still include the water quality objectives in Section II.C (formerly Section III.B.2) of the Provisions as receiving water limitations in the NPDES permit. The Water Board could require a discharger to conduct routine monitoring as necessary.

5.7.8 Consideration of Variances and Exceptions to the Toxicity Water Quality Objectives

Under the Provisions, Regional Water Boards would have the option to grant time-limited or short-term relief from meeting the numeric and narrative toxicity water quality objectives.

For water bodies that are waters of the United States (U.S.), subsequent to a public hearing, a Regional Water Board may grant a variance for meeting the toxicity water quality objectives in accordance with 40 CFR section 131.14. A variance may be granted to a specific discharger, or group of dischargers, a water body, or a water body segment as specified in the variance. A water quality variance would need to comply with CEQA requirements, would need to be consistent with the State Water Board's Variance Policy, and would be subject to U.S. EPA review and approval.

For purposes of resource and pest management in water bodies that are waters of the state, but not waters of the U.S., a Regional Water Board may grant a short term or seasonal exception to private or public entities from meeting the numeric and narrative toxicity water quality objectives. Resource and pest management projects may include, but are not limited to, vector and weed control, pest eradication, and fisheries management projects. A short term or seasonal exception would need to comply with CEQA requirements and the Regional Water Board would need to make a finding that the exception is necessary to implement control measures for resource or pest management. The discharger would be responsible for notifying all potentially affected members of the public and governmental agencies. The discharger would also need to submit all of the information listed in III.F.2 (formerly Section IV.B.5.b) of the Provisions to the Regional Water Board prior to being granted an exception. Upon completion of the project the discharger would need to provide certification by a qualified biologist to the Regional Water Board verifying that all of the receiving water's designated beneficial uses have been restored.

6 REASONABLY FORESEEABLE METHODS OF COMPLIANCE

6.1 Introduction

The State Water Board's SED for a proposed project is required to include an analysis of the reasonably foreseeable methods of compliance with the project (see Cal. Code Regs., tit. 23, §3777(c); Pub. Res. Code, § 21159(d)). This chapter provides a description of the reasonably foreseeable methods of compliance for each element of the Provisions. As explained below, this chapter also provides additional information regarding the many different types of possible toxicity controls, even though those controls are not considered to be reasonably foreseeable methods of compliance.

As indicated in more detail in Chapter 5, it is not expected that the Provisions would result in an overall net increase in toxicity detections. However, the Provisions are expected to lead to an increase in the number of non-storm water NPDES dischargers that are required to conduct routine monitoring for chronic and/or acute toxicity and comply with toxicity effluent limitations. In addition, it is expected that most non-storm water NPDES permits and some storm water NPDES and non-point source permits would include a receiving water limitation based on the numeric water quality objectives indicated in the Provisions.

The possibility that any given discharger would implement a specific toxicity control as a method of complying with toxicity effluent limitations, toxicity reduction evaluations, receiving water limitations or other requirements in the Provisions is speculative. Whether a discharger would choose to implement additional toxicity controls as a result of the Provisions to address toxicity would depend, in part, on whether the discharger already needs to comply with existing toxicant-specific or existing aquatic toxicity monitoring requirements, effluent limitations, or receiving water limitations. Whether a discharger chooses to implement additional toxicity controls may also depend on the nature, type, and persistence of any toxicity detections, and whether the cause of the toxicity or the identity of the toxicant is determined.

The Water Boards do not mandate the manner of compliance (see Water Code section 13360(a)), so any discharger that chooses to implement a toxicity control is free to select any particular toxicity control or combination of toxicity controls. If a discharger chooses to implement an additional toxicity control, the discharger's selection of one or more particular toxicity controls would depend on the type of facility, the type of toxicity controls already in place at the facility, and the quality of the existing effluent of the discharger. The type of toxicity control selected by the discharger could also depend on whether the cause of the toxicity (e.g., malfunctioning equipment) or the toxicant (e.g., identification of high copper amount in the effluent) are identified. It is more likely that dischargers would select toxicity controls that are less expensive and have lower environmental impact (e.g., institutional toxicity controls or optimization of existing structural toxicity controls) rather than toxicity controls that are more expensive and have higher environmental impacts (e.g., new structural toxicity controls). Ultimately, however, it is unclear which toxicity control would be selected.

Therefore, the possibility that any particular discharger might implement additional toxicity controls as a result of the Provisions is speculative. To the extent that a discharger does choose to implement additional toxicity controls as a result of the Provisions, the possibility that the discharger would choose to implement any particular toxicity control, or any combination of particular toxicity controls, out of the many different types of toxicity control(s) is also speculative.

Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, this chapter will discuss possible toxicity controls.

The discussion of possible toxicity controls related to the Provisions are divided by discharger type where possible toxicity controls relevant to the discharger classification are discussed further. The discharger types are:

- Non-storm Water NPDES Discharger
- Storm Water NPDES Dischargers
- Non-point Source Dischargers

The possible toxicity controls for each discharger type are not intended to be exhaustive of all possible toxicity control methods and permittees have the discretion to select other toxicity controls.

Chapter 7 contains the environmental analysis of the possible toxicity controls identified in this chapter and the potential environmental impacts of this project. Chapter 8 provides an analysis of alternatives to the project that would mitigate the potential environmental impacts.

6.2 Reasonably Foreseeable Methods of Compliance and Possible Toxicity Controls Applicable to Non-Storm Water NPDES Dischargers

For non-storm water NPDES dischargers, the methods of compliance with the Provisions are:

- An increase in monitoring, testing and laboratory analysis

Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, this chapter will discuss possible toxicity controls.

For non-storm water NPDES dischargers, the toxicity controls discussed below can be used by some or all of the various types of dischargers. However, the specific way in which these toxicity controls are designed, installed, and operated may vary depending on the facility design and the specific toxicants that the methods are designed to prevent or remove from the effluent. The most widely and commonly used methods of toxicity controls come from an extensive review of current non-storm water NPDES permits and possible toxicity controls. The possible toxicity controls include:

- Institutional controls (non-structural) which reduce or minimize the quantity of toxicants used by a facility, or in the influent coming into a discharge facility
- Treatment or engineering controls (structural), including facility upgrades to prevent, reduce, or remove toxicity

The possible toxicity controls discussed in this chapter apply to whole effluent toxicity of potentially unknown origin. If the failure of a WET test can be attributed to an exceedance of a chemical-specific limit, the permittee may comply with the effluent limitations in the Provisions by addressing the chemical-specific exceedance. In doing so, it is not anticipated that new toxicity controls will be imposed as a result of the Provisions.

6.2.1 Numeric Toxicity Water Quality Objectives

Sections II.C.1 and II.C.2 (formerly Sections III.B.2.a and III.B.2.b) of the Provisions establish numeric objectives for chronic and acute toxicity, which apply to all inland surface waters, enclosed bays and estuaries in the state with aquatic life beneficial uses. A detailed discussion of the numeric toxicity water quality objectives is provided in Section 5.1.1 of the Staff Report.

The overall number of exceedances is not expected to increase using the TST approach compared to other current statistical approaches (see Section 5.3.1 of the Staff Report). Thus, the number of waterbodies determined to be impaired for toxicity is also likely to remain about the same. However, assessment using numeric water quality objectives and the TST approach may identify toxicity in different waterbodies than other current statistical approaches. Non-storm water NPDES discharges that discharge into waters that do not meet the water quality objective in the Provisions may be required, as indicated in a TMDL or other action, to further reduce toxicity in their effluent.

Receiving water limitations are established in WDRs to ensure that a discharger does not cause or contribute to an exceedance of water quality objectives. Currently, many NPDES permits for non-storm water dischargers include narrative receiving water limitations for toxicity. It is likely that the Regional Water Boards would include receiving water limitations in permits based on the numeric water quality objectives established in the Provisions. While a net increase in toxicity detections is not expected, it is possible that a discharger may be identified as exceeding the numeric toxicity receiving water limitation. If a discharger has caused, could cause or contribute to toxicity in ambient water, the discharger may take steps, to prevent or reduce that toxicity.

As indicated previously, the implementation of toxicity controls as a result of exceedances of the receiving water limitations is speculative. However, a discussion of possible toxicity controls is included in Section 6.3 of the Staff Report.

6.2.2 Aquatic Toxicity Test Methods

A detailed discussion of the aquatic toxicity test methods, including current conditions, is provided in Section 5.2.1 of the Staff Report.

Non-storm water NPDES dischargers that do not use the U.S. EPA test methods and aquatic species that are amenable with the TST approach would have to use these test methods and species in their processes to comply.

6.2.3 Required Use of the Test of Significant Toxicity Statistical Approach

A detailed discussion of the statistical approach, including current conditions, is provided in Section 5.3.1 of the Staff Report.

The Provisions require non-storm water NPDES dischargers to use the TST approach to determine whether discharger's effluent complies with applicable permit terms. Five of the nine Regional Water Boards require dischargers to use the TST approach. A permit review by the State Water Board found that over 20 percent of non-storm water NPDES permits include a requirement to use the TST approach. Software for using the TST approach is readily available and is being used by toxicity testing laboratories in California.

Non-storm water NPDES dischargers that do not currently use the TST approach would comply with the Provisions by using the TST approach to analyze aquatic toxicity test data.

6.2.4 Species Sensitivity Screening

A detailed discussion of the species sensitivity screening, including current conditions, is provided in Section 5.4.1 of the Staff Report.

The Provisions state how and when species sensitivity screening is required. Typically, species sensitivity screening would be conducted prior to every permit issuance, reissuance, renewal, or reopening (to address the toxicity requirements). However, Regional Water Boards may allow dischargers up to 15 years between species sensitivity screenings. Non-storm water NPDES dischargers are only required to conduct species sensitivity screening for chronic toxicity, unless a Regional Water Board also requires species sensitivity screening for acute toxicity. Non-storm water NPDES dischargers would need to use the species sensitivity screening process as specified in the Provisions at least once every 15 years to be in compliance.

The Provisions provide clear direction on the number of tests needed for species sensitivity screening, the number of species to be used, and the timing for the species sensitivity screening tests. The method of compliance would be to conduct the required testing and analysis.

6.2.5 Reasonable Potential

A detailed discussion of reasonable potential analysis, including current conditions, is provided in Section 5.4.2 of the Staff Report.

POTWs that are authorized to discharge at rate equal to or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) are required to conduct routine chronic toxicity testing and meet chronic toxicity effluent limitations. Therefore, a reasonable potential analysis for chronic toxicity is not required for POTW dischargers of this size that are required to have a pretreatment program. POTWs authorized to discharge at rate less than 5 MGD, or that are not required to have a pretreatment program are required to conduct reasonable potential analysis for chronic toxicity. The Water Boards may, at their discretion, require any POTW discharger to conduct a reasonable potential analysis for acute toxicity.

All other non-storm water NPDES dischargers are required to conduct a reasonable potential analysis for chronic toxicity. The Water Boards may, at their discretion, require non-storm water NPDES discharger to conduct a reasonable potential analysis for acute toxicity. The Water Boards may exempt some dischargers, including insignificant dischargers, biological pesticide and residual pesticide dischargers, drinking water system dischargers, and natural gas facility dischargers from conducting a reasonable potential analysis using the procedures in the Provisions.

Non-storm water NPDES discharges can comply with the reasonable potential requirements in the Provisions by providing all toxicity test data, and data analysis generated within five years prior to permit issuance, reissuance, renewal or reopening (to address the toxicity requirements) to the Regional Water Board. A minimum of four tests, using species selected by the Regional Water Board from Table 1 of the Provisions, must be analyzed using the TST approach. Thus, non-storm water NPDES dischargers that use the TST approach to analyze toxicity test data would only need to submit the toxicity test data and results generated within five years prior to every permit reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements) to the Water Boards to comply with the reasonable potential requirement in the Provisions.

If a discharger is using a statistical approach, other than the TST approach, to analyze toxicity test data, the method of compliance would be to reanalyze the data from all toxicity tests conducted at the IWC, using the most sensitive species, within five years prior to permit reissuance, renewal or reopening (if the permit reopening is to address toxicity requirements), with a minimum of four tests, using the TST approach and submit the data and results, along with all other toxicity test data generated during that time to the Water Boards.

If a minimum of four tests conducted at the IWC using species selected by the Water Boards from Table 1 of the Provisions are not available, and there is representative effluent, the method of compliance would be for the discharger to conduct four additional chronic and/or acute toxicity tests and submit the data and results to the Water Boards, along with all other toxicity test data generated within five years prior to permit reissuance, renewal or reopening (if the permit reopening is to address toxicity requirements). Thus, the methods of compliance include the submittal and review of data and information as required by the Provisions.

6.2.6 Monitoring Frequencies

A detailed discussion of monitoring frequencies, including current conditions, is provided in Section 5.4.4 of the Staff Report.

Non-storm water NPDES dischargers required to conduct routine monitoring, must do so at the IWC using the most sensitive species at the frequency specified in their permit. For dischargers with effluent limitations, MMEL compliance tests are required when an acute or chronic routine monitoring test results result in a fail at the IWC. For each fail, the non-storm water NPDES dischargers would conduct a maximum of two MMEL compliance tests. For dischargers that do not have chronic toxicity monthly median effluent limitations, MMET tests are required when an acute or chronic routine monitoring test results in a fail at the IWC. For each fail, the non-storm water NPDES dischargers would conduct a maximum of two MMEL compliance tests.

Some non-storm water NPDES dischargers are already conducting routine monitoring at the same frequencies as required in the Provisions for chronic and acute toxicity. These facilities would not be required to increase their routine monitoring frequency to be in compliance with the Provisions. Those non-storm water NPDES dischargers that are conducting routine monitoring less frequently than is specified in the Provisions would need to increase their monitoring frequency when their permit is next reissuance, renewal or reopening (if the permit reopening is to address toxicity requirements). And the monitoring frequency requirement in the Provisions are included in their permit. Dischargers that currently do not have toxicity monitoring requirements may now have toxicity monitoring requirements under the Provisions.

Monitoring is a multi-stage process, with multiple components. In the context of toxicity testing, there are three components to a single monitoring event: the collection of samples, the transportation of the samples, and the analysis of the samples. Some dischargers contract with third-party laboratories and environmental companies to collect and analyze samples, in which case the samples must be transported off-site from the facility. Other dischargers have on-site laboratories, in which case transport and sampling requirements may be negligible. The method of compliance for those with less frequent monitoring than that required by the Provisions, would be to conduct the required monitoring.

6.2.7 Toxicity Effluent Limitations

A detailed discussion of the toxicity effluent limitations, including current conditions, is provided in Section 5.4.3 of the Staff Report.

The Provisions require the Water Boards to include chronic toxicity effluent limitations for non-storm water NPDES dischargers when the discharger has reasonable potential to cause or contribute to chronic toxicity, or if a POTW is authorized to discharge at a rate equal to or greater than 5.0 MGD and is required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020). The Water Boards must include acute toxicity effluent limitations in NPDES permits when the discharger has reasonable potential to cause or contribute to acute toxicity. The MDELs and MMELs are based on an analysis of the most sensitive species toxicity testing conducted at the IWC, using the TST approach and percent effect.

Some non-storm water NPDES permits already contain effluent limitations for aquatic toxicity that are similar to those in the Provisions. Many non-storm water NPDES permits do not contain effluent limitations for aquatic toxicity and instead contain numeric triggers to determine if more monitoring or a TRE is required. A comparison of existing permit conditions and the effluent limitations in the Provisions are discussed in Section 5.4.3 of the Staff Report. If a non- storm water NPDES discharger does not meet the chronic and/or acute effluent limitations in the Provisions, the discharger may choose to implement additional toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, this chapter will discuss possible toxicity controls.

Because the Provisions do not specify the control measures that can be used to comply with the effluent limitations in the Provisions, dischargers may choose to implement a wide variety of toxicity controls. It is not possible to list every toxicity control measure that a discharger may implement to comply with the effluent limitations in the Provisions. There are -6 that are implemented by non-storm water NPDES dischargers throughout the state. The most common possible toxicity controls are discussed in Section 6.3 of this chapter.

6.2.8 Mixing Zones

A detailed discussion of mixing zone requirements, including current conditions, is provided in Section 5.4.5 of the Staff Report.

The Provisions would provide Regional Water Boards the continued discretion to grant mixing zones and dilution credits for acute and chronic toxicity to non-storm water NPDES dischargers on a discharge-by-discharge basis. The Provisions would not require Regional Water Boards to grant mixing zones, but the Provisions would specify that a Regional Water Board may allow mixing zones and dilution credits for chronic toxicity when sufficient capacity exists in the receiving waters for dilution and mixing zones. Since the Provisions do not require any changes to mixing zones no changes would be required regarding mixing zones for non-storm water NPDES dischargers to be in compliance with the Provisions. However, the way in which mixing zones and dilution credits are used to develop effluent limitation is specified in the Provisions and may be different than the way mixing zones and dilution credits are used to establish effluent limitations in some existing permits.

6.2.9 Toxicity Reduction Evaluations.

A detailed discussion of the TRE requirement is provided in Section 5.4.6 of the Staff Report.

The Provisions require non-storm water NPDES dischargers to conduct a TRE if they have chronic or acute aquatic toxicity effluent limitations, and have any combination of two or more MDEL or MMEL violations within a single calendar month or within two successive calendar months. The Provisions also require non-storm water NPDES dischargers to conduct a TRE if they do not have chronic aquatic toxicity effluent limitations, and they do not meet two or more MDET or MMET within a single calendar month or within two successive calendar months. Appendix J of the Staff Report provides specific examples of TRE evaluations and mitigation measures that eliminated the source of toxicity.

Most permits currently rely on accelerated monitoring to determine when a non-storm water NPDES discharger must initiate a TRE. As permits are renewed or reopened (if the permit reopening is to address toxicity requirements), the permits for non-storm water NPDES dischargers would specify, in accordance with the Provisions, when a TRE is required. Discharges would comply with the Provisions by initiating a TRE whenever there are two or more effluent limitation violations, or effluent targets are not met two or more times, in a single calendar month, or within two successive calendar months.

It is unknown if this change in TRE requirements will result in any change in the number of TREs that are conducted or, if it would result in a change in the number or type of control actions taken by facilities to control aquatic toxicity. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, this chapter will discuss possible toxicity controls.

Because the Provisions do not specify the control measures that can be used to control aquatic toxicity and comply with the effluent limitations in the Provisions, dischargers may choose to implement a wide variety of toxicity controls. It is not possible to list every toxicity control measure that a discharger may implement to comply with the effluent limitations in the Provisions. However, there are several possible toxicity controls that are implemented by non-storm water NPDES dischargers throughout the state. The most common methods of compliance are discussed in Section 6.3 of this Staff Report.

6.3 Possible Toxicity Controls at Non-Storm Water NPDES Discharge Facilities

As indicated in more detail in Chapter 5, it is not expected that the Provisions would result in an overall net increase in toxicity detections. However, the Provisions are expected to lead to an increase in the number of non-storm water NPDES dischargers that are required to conduct routine monitoring for chronic and/or acute toxicity and comply with toxicity effluent limitations. In addition, it is expected that most non-storm water NPDES permits and some storm water NPDES and non-point source permits would include a receiving water limitation based on the numeric water quality objectives indicated in the Provisions.

For example, there may be reasonable potential for toxicity per the Provisions, but not per current assessment methods. The Provisions would require such dischargers to conduct routine monitoring. If routine monitoring reveals persistent toxicity in the effluent the discharger may implement controls to address that toxicity. Similarly, under the Provisions, some dischargers will need to increase their routine monitoring frequency for chronic toxicity. An increase in the routine monitoring frequency may discover aquatic toxicity, whereas less frequent monitoring under current conditions may not.

The use of the TST approach is not anticipated to result in an increase in the number of exceedances, compared to current statistical approaches such as the NOEC. However, for a small number of tests, the TST approach may determine a different outcome than other statistical approaches.

The Provisions include maximum daily and median monthly effluent limitations which will result in a violation when exceeded. For some dischargers the numeric effluent limitations in the Provisions may result in an increase in the number of violations for the facility. This is because many of the non-storm water NPDES permits throughout the state include only numeric triggers, which require a discharger to take some action when they are exceeded, but do not result in a violation.

The requirement in the Provisions for when a discharger must conduct a TRE are different from the TRE requirements in current permits that were reviewed. It is unknown if this change in TRE requirements will result in any change in the number of TREs that are conducted or in which facilities may be required to conduct a TRE. It is also unknown if the change in TRE requirements will result in any changes to the number or type of control actions taken by facilities to control aquatic toxicity.

The possibility that any particular discharger might implement additional toxicity controls as a result of the Provisions is speculative. To the extent that a discharger does choose to implement additional toxicity controls as a result of the Provisions, the possibility that the discharger would choose to implement any particular toxicity control, or any combination of particular toxicity controls, out of the many different types of toxicity control(s) is also speculative.

Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, this chapter will discuss possible toxicity controls.

Possible toxicity controls are listed below, however the list is not exhaustive. Some facilities already have controls and technology in place to comply with effluent limitations, requiring few or no changes, while other facilities may choose to implement, enhance, or modify institutional controls or structural controls. As it would be impossible to address every control for every potential pollutant or combination of pollutants, the most common examples are addressed below, divided into non-structural and structural categories. Although all the controls listed below are applicable to POTW dischargers, most are also toxicity controls that can be used by other non-storm water NPDES dischargers. If a certain type of possible toxicity control is specific to a discharger, the discharger is identified, however due to the extensive nature of controls and dischargers the identification is non-exhaustive. The described possible toxicity controls are not intended to be exhaustive of all possible toxicity control methods, and permittees have the discretion to select other toxicity controls.

6.3.1 Non-Structural or Institutional Controls

Non-structural controls or institutional controls, for the purpose of this document, refer to the practices and programs designed to prevent diffuse sources of toxicity from entering waterbodies and treatment facilities. Institutional controls are non-engineered instruments such as administrative and legal controls that, depending on the size and scope, can be implemented by municipal governments or agencies, or by permittees. Institutional controls for aquatic toxicity include but are not limited to: (1) educational and toxicity minimization programs; (2) hazardous and toxic waste disposal programs; and (3) use of alternative chemicals.

Educational and Toxicity Minimization Programs

Educational programs and toxicity minimization programs often work in conjunction to prevent and reduce aquatic toxicity. Examples of educational and toxicity minimization programs facilitated though municipal agencies include programs and publications such as the California Environmental Protection Agency’s Unified Program (https://calepa.ca.gov/wp- content/uploads/sites/62/2016/10/CUPA-Documents-2012yr-FactSheet.pdf). Additional programs include marking storm drains to prevent dumping and the Department of Toxic Substance Control (DTSC) Pollution Prevention and Green Technology Program (https://www.dtsc.ca.gov/PollutionPrevention/index.cfm). An example of an educational program and toxicity minimization programs facilitated through permittees is the Sacramento Regional Sanitation District's Bufferlands tours and educational and outreach program (https://www.regionalsan.com/bufferlands-educational-opportunities), and the publicly available tour of their wastewater treatment facility. Permittees, specifically POTWs may choose to run educational programs to reduce the toxicants in the influent through raising public awareness of what can and cannot be disposed of through sewer systems. Wineries can also participate in toxicity minimization programs through Sustainability in Practice (SIP) Certification, http://www.sipcertified.org/.

A toxicity minimization program works by identifying sources or potential sources of toxicity such as influent, treatment methods, or facility design, and taking the necessary steps to reduce or eliminate those sources. If influent is found to be toxic, a minimization program would analyze potential external sources, while treatment methods and facility design would be reviewed in-house to determine if facility practices are creating toxicity. A minimization program may include a plan to identify the source of toxicity and work with businesses and/or residents that may be causing or contributing to the source of toxicity to find suitable methods to control or eliminate the toxicity.

Hazardous and Toxic Waste Disposal Programs

Hazardous waste programs work to ensure hazardous waste is disposed of properly and are often run free of charge or at reduced rates through local municipalities. Household hazardous waste programs include designated drop off locations on select days, and free pickup services if the waste is packaged according to local guidelines. Many municipalities in California already provide household hazardous waste collection programs. For example, the city of Rancho Cordova offers free pick-up of used motor oil if it is placed in a clear plastic jug, or in a free provided container, and placed next to a residential recycling bin (http://www.cityofranchocordova.org/home/showdocument?id=12854).

Many municipalities in California also provide business hazardous waste programs that provide safe hazardous waste collection programs for schools, hospitals, and small businesses. These programs offer services for the collection and proper disposal of hazardous waste generated from businesses. For example, the Alameda County business hazardous waste program offers small business hazardous waste services, a drop-in program for businesses, and residential landlord services (http://www.stopwaste.org/recycling/residents/hazardous-waste/business- hazardous-waste).

Additionally, the California Department of Toxic Substance Control (DTSC) implements hazardous waste recycling laws and developed hazardous waste recycling regulations to promote the reuse and reclamation of useful materials in a manner that is safe and protective of human health and the environment. DTSC provides information and resources for businesses and residents to properly manage hazardous waste (https://www.dtsc.ca.gov/HazardousWaste/Index.cfm).

Alternative Chemicals

Dischargers could choose an alternative chemical in their operations or treatment to reduce the possible toxicants entering surface waters. In addition, often less toxic alternatives may be available to the public for chemicals used for cleansers and disinfectants, pesticides, lubricants, fragrances, and many other common classifications of chemicals that may enter POTWs.

Government, environmental organizations, and some businesses have worked toward developing lists of suitable alternatives to chemicals that may cause or contribute to toxicity. For example, in July 2005, the commonwealth of Massachusetts funded the Toxics Use Reduction Institute (TURI) at UMass Lowell to study safer alternatives for major uses of five toxic chemicals. The TURI continues to work to provide resources and tools to help businesses, municipalities, and communities find safer alternative to toxic chemicals. In 2011, the Zero Discharge of Hazardous Chemicals (ZDHC) Program formed to catalyze positive change in the discharge of hazardous chemicals across the product life cycle. California's DTSC provides a safer consumer products program to help residents and businesses find safer alternatives to projects that contain chemicals of concern (https://www.dtsc.ca.gov/SCP/index.cfm).

6.3.2 Structural Controls

Structural controls are used by facilities to clean their wastewater and ensure their effluent meets the water quality objective. Structural controls are engineered instruments such as holding ponds, filters, skimmers and chemicals used in the wastewater treatment process to address unfavorable physical, chemical or biological characteristics. Structural controls for aquatic toxicity include but are not limited to: (1) pretreatment; (2) primary treatment; (3) secondary treatment; and (4) advanced (tertiary) treatment. There are also structural controls that, depending on how they are used, may be used at any stage of the treatment process.

These includes but are not limited to: (1) physical unit processes; (2) chemical unit processes; and (3) biological unit processes.

Wastewater treatment for POTW and industrial dischargers is done in a series of steps that can have increasing effectiveness on the reduction of toxicity, and increasing complexity depending on the resources available. The conventional treatment sequence is: pretreatment, then primary treatment, and secondary treatment, where each step utilizes a variety of structural controls. Many dischargers also use a range of advanced or tertiary treatment controls to further reduce or eliminate toxic substance in effluent. However, not all methods listed below are applicable to every type of non-storm water NPDES discharger. For example, the biological methods used to process sewage at a POTW may not be effective methods for an industrial facility that processes chemicals or metals. POTW dischargers in California use primary and secondary treatment methods to remove toxic substances from their effluent. Many POTW dischargers also incorporate various pretreatment, primary, secondary and tertiary treatment methods to further ensure their effluent is non-toxic. Industrial dischargers can do the same, choosing from a variety of pretreatment, primary, secondary and tertiary treatment methods that most effectively treats their effluent. Although the treatment methods discussed below are methods that are effectively used by many POTWs, not all methods discussed below are effective control measures for all POTWs. In addition, many of the potential control methods discussed below are effective methods of controlling toxicity in effluent for many types of industrial dischargers, including refineries, processors, and manufacturers in California.

Pretreatment

Toxicants in influent can be addressed through a variety of pretreatment measures and controls. In addition to the nonstructural controls such as educational and toxicity minimization programs (6.3.6.1), a variety of structural controls can be used in an effort to remove or reduce toxicants and remove constituents that could disrupt any subsequent treatment processes. Depending on the quality of the influent to be treated, several processes could be required. Such processes include but are not limited to:

- Screening and Straining removes large objects to prevent them from becoming entrained in pipes and moving parts of the treatment plant, where they can cause damage to the facility or impact the efficiency of the treatment process. Screening and straining is a useful treatment process for POTWs, and power plants.

- Grit Removal involves allowing heavy materials to settle out of influent in grit settling chambers and using mechanical separation equipment to remove the settled out grit. Grit removal is necessary to prevent or reduce clogging pipes and machinery and is a useful treatment process for POTWs and food processors.

- Fat, Grease and Oil Removal is accomplished with the use of skimmers. Air blowers may assist by blowing air in the base of the tank to create froth. The removal of fats and grease helps speed up the biological processes and is a useful treatment process for POTWs, petroleum refineries, food processors, and tank farms.

- Flow Equalization increases the efficiency of the primary and secondary treatment processes by allowing waste water sufficient time in settling tanks, and in tanks where biological processes are occurring. Flow equalization is a useful treatment process for POTWs, petroleum refineries, and food processors.

POTW dischargers receive influent from a wide variety of private residences, commercial business, or smaller industrial facilities that do not have separate discharge permits. POTWs have limited control over the pollutants that may come into their system. However, POTWs or related government agencies can take action when businesses or commercial facilities discharge toxic chemicals into sewer systems.

The Clean Water Act established the National Pretreatment Program, which requires POTWs “with a total design flow greater than 5 MGD and receiving from Industrial Users” to establish a pretreatment program specific to that POTW (40 CFR § 403.8). These pretreatment programs, which specifically target industrial sources, are already in place for POTW dischargers in California, except where the Water Boards have made a finding that there are no industrial sources contributing to the influent. There are no pretreatment programs required for POTWs with a design flow of less than 5 MGD. However, POTWs with a design flow of less than 5 MGD are not precluded from implementing a pretreatment program and may voluntarily work with industrial sources and municipalities to reduce toxicity in their influent.

Primary Treatment

In primary treatment a portion of suspended solids and organic matter is removed from wastewater. This removal is usually accomplished with physical operations such as screening and sedimentation. The effluent from primary treatment usually contains considerable organic matter and has a relatively high biological oxygen demand (BOD). Treatment plants using only primary treatment will be phased out as the U.S. EPA requires at least secondary treatment, excluding communities with a secondary treatment waiver.

Chemicals added for effluent treatment can introduce the potential for toxicity into the effluent. For example, petroleum refineries may use emulsion breakers to separate residual oil from the surface of wastewater. There are many types of chemicals used as emulsion breakers, some of which may induce toxicity. The toxicity-inducing substance is part of a controlled process, and mitigation of toxicity may be accomplished through changes in chemical inputs, chemicals used in processes, or even the processes themselves.

For toxic chemicals added for in-facility production or treatment use, it is possible to remove the toxicant from the production or treatment process. A discharger may accomplish this by substituting a different chemical for the toxicant, such as changing the type of disinfectant used to control fouling in pipes or tanks.

Secondary Treatment

Secondary treatment is designed to remove biodegradable organics and suspended solids and includes disinfection. Secondary treatment often includes biological treatment by activated sludge, fixed-film reactors, lagoon systems and sedimentation where microbes consume the organic matter as food, converting it to carbon dioxide, water, and energy.

Advanced (Tertiary) Treatment

Advanced treatment is any treatment process beyond secondary treatment and involves the removal of constituents of concern, nutrients, toxic compounds, increased amounts of organic material and suspended solids. Advanced treatment includes nutrient removal processes such as the addition of metal salts, chemical coagulation, flocculation, sedimentation followed by filtration, ion exchange, reverse osmosis and UV disinfection.

Other Structural Controls

Below is a list and brief description of the structural controls that, depending on how they are used, may be used at any stage of the treatment process (pretreatment, primary, secondary or advanced). The list is non-exhaustive and represents the most commonly used controls as gathered from a review of current NPDES permits and water treatment literature. It does not list every type of permittee and all possible effluent characteristics. It is the responsibility of the discharger to determine what treatment methods are most appropriate for their effluent.

Physical Unit Processes

- Coagulation and Flocculation is used to from aggregates of fine matter to aid in the filtration process. Coagulation and flocculation are often the first steps in water treatment. Chemicals with a positive charge are added to the wastewater. The positive charge of these chemicals neutralizes the negative charge of dirt and other dissolved particles in the wastewater. When this occurs, the particles bind with the chemicals and form larger particles, called floc. During sedimentation, floc settles to the bottom of the water column, due to its weight. Coagulation and flocculation aid in the removal of suspended solids and reduced BOD, and is therefore a useful process for POTWs, mines and power plants.

- Sedimentation and Settling Ponds or the settling out of suspended solids can be used independently or to complement coagulation and flocculation. Sedimentation is a useful process for POTWS, power plants, food processors, saw mills, sand and gravel mining, mines, and fish hatcheries/aquaculture.

- Filtration is the act of removing contaminates from water by passing them through a porous membrane. Filters come in a great variety of designs and can be used to treat a variety of water quality issues. Choosing a filtration method is dependent upon the constituent desired to be removed and permittees should consider the filter size, filter bed porosity, filter bed depth, filtration rate, allowable head loss and influent wastewater characteristics. Common filter examples include trickling filters, granulated activated carbon (GAC) filters, percolating filters, centrifuge filters, and packed media filters. Because filtration has a great variety of applications, filtration is a useful process for all NPDES dischargers. Permittees should work with treatment engineers to determine what method of filtration is ideal to use to clean their effluent.

Chemical Unit Processes

- Chemical Precipitation is the addition of chemicals to alter the physical state of dissolved or suspended solids and to facilitate their removal by sedimentation.

Chemical precipitation can be used to remove metals by transforming dissolved metal ions into an insoluble metal precipitate, and chemical precipitation can be used to remove nitrogen and phosphorus. Chemical precipitation is therefore a useful tool for POTWS, petroleum refineries and saw mills.

- Adsorption is the process of collecting soluble substances that are in solution on a suitable interface. Adsorption methods include the use of activated carbon, GAC, or powdered activated carbon (PAC) which aid in the removal of hydrocarbons, and is a useful tool for POTWs, petroleum refineries and boat yards.

- Chemical Oxidation causes pollutants to undergo structural changes which make the pollutants less harmful. Oxidation can be used to treat organic and sometimes inorganic compounds and is a useful process for POTWS.

- Chemical Stabilization is similar to chemical oxidation and it slows down the rate of biological growth. Chemical stabilization can be a useful process for water with high nutrient contents such from POTWS, fish hatcheries, power plants, and sawmills.

- Disinfection is the selective destruction of disease causing agents. This can be accomplished using radiation such as electromagnetic or ultraviolet, chemicals such as chlorine or sodium hypochlorite, physical agents such as heat, or mechanical means such as screening. Disinfection is a useful process for POTWs, power plants, food processors, and fish hatcheries/aquaculture.

- Neutralization is the adjustment of process water pH. This can be accomplished by the addition of neutralizing chemicals either to adjust the pH of wastewater, or to precipitate out a metal for collection. Therefore, neutralization may be a useful process for POTWs, metal mining, fish hatcheries/aquaculture, refineries, power plants and many other dischargers.

Biological Unit Processes

- Aerobic, Anoxic, Anaerobic and Combined Processes are processes which use biological agents to break down organic matter and covert them to gases. Aerobic processes take place in the presence of oxygen and anoxic processes are used to remove nitrogen in the presence of oxygen. Anaerobic processes also remove nitrogen; however, they do not take place in the presence of oxygen. These processes can be used to break down a variety of organic matter and are therefore processes for POTWs and petroleum refineries.

- Aeration is the circulation of air through wastewater to facilitate aerobic bio-degradation. Aeration uses microorganisms, added or naturally occurring, to break down water contaminates. Aeration breaks down organic matter and is therefore an important process for POTWS, petroleum refineries, food processors, and fish hatcheries/aquaculture.

- Biofiltration of Carbon, Nitrogen and Nitrates employs sand filters, contact filters, or trickling filters to ensure that additional sediment is removed from wastewater. Of the three filters, trickling filters are typically the most effective for small-batch wastewater treatment. Biological purification can be achieved by mixed cultures to treat nitrogen and carbon and is a useful process for POTWs.

- Oxidation Ponds utilize natural bodies of water like lagoons or ponds. They are referred to as final polishing ponds or facultative lagoons. Wastewater is allowed to pass through the pond for a period of time and is then retained for two to three weeks. The process uses microorganisms to metabolize biological and organic wastes into less-toxic or non-toxic forms. These processes can be helpful when treating large volumes of water, and are therefore useful processes for POTWs, petroleum refineries, and fish hatcheries/aquaculture.

6.4 Reasonably Foreseeable Methods of Compliance and Possible Toxicity Controls for Storm Water NPDES Dischargers

Clean Water Act section 402, subdivision (p), (33 U.S.C. §1342(p).) and Water Code section 13263 and 13377 authorize the Water Board to issue individual and general NPDES permits for storm water discharges. There are a few categories of storm water discharge including industry, construction, Caltrans, and municipal separate storm sewer systems (MS4s).

Due to the periodic nature of storm water, it may be difficult to identify the source of the toxicant in toxic storm water, however general practices may be taken to reduce toxicity for unknown toxicants in storm water. Possible toxicity controls may vary considerably between dischargers. Many storm water dischargers already have controls and technology in place and would require few or no changes to ensure that receiving waters continue to meet water quality objectives, while other dischargers may choose to implement structural and/or non-structural controls or a combination of both to ensure that they do not cause or contribute to exceedances of receiving water limitations. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, this chapter will discuss possible toxicity controls.

Unlike non-storm water NPDES dischargers, the Provisions do not stipulate specific monitoring requirements, and therefore monitoring requirements are not discussed here.

6.4.1 Required Use of the Test of Significant Toxicity Statistical Approach

A detailed discussion of the statistical approach, including current conditions, is provided in Section 5.3.1 of the Staff Report. Section III.D (formerly Section IV.B.3) of the

Provisions describes implementation for storm water dischargers regulated pursuant to NPDES permits. If the Water Boards require storm water dischargers to conduct chronic or acute toxicity tests using test methods and Table 1 species as described in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions, then storm water dischargers must use the TST approach to analyze toxicity test data.

Storm water dischargers must also report both the results of the toxicity tests to the Water Boards as a pass or fail, and the percent effect. Software for using the TST approach is readily available and is already being used by several toxicity testing laboratories in California.

6.4.2 Numeric Toxicity Water Quality Objectives

As indicated previously, the implementation of toxicity controls as a result of exceedance of a numeric receiving water limitation is speculative. To inform decision-makers and the public, a list of possible toxicity controls are discussed below by category: municipal, industrial, construction and Caltrans. A detailed discussion of the numeric toxicity water quality objectives is provided in Section 5.1.1 of the Staff Report. Sections II.C.1 and II.C.2 (formerly Sections III.B.2.a and III.B.2.b) of the Provisions establish numeric water quality objectives for chronic and acute toxicity, which apply to all inland surface waters, enclosed bays and estuaries in the state with aquatic life beneficial uses.

6.4.3 Possible Toxicity Controls by Storm Water Discharger Type

Storm water dischargers are regulated under NPDES storm water permits, requiring appropriate controls measures. These NPDES permits typically include receiving water limitations based on water quality objectives and may include associated monitoring for compliance with those limitations. Staff do not expect the numeric water quality objectives to cause an increase in the number of waters that are listed as impaired for toxicity. While a net increase in toxicity detections is not expected, it is possible that a discharger may be identified as exceeding a numeric toxicity receiving water limitation. If a discharger caused or contributed to a toxic event, the Water Boards may require, or the discharger may elect to take steps to prevent or reduce toxicity. As indicated previously, the implementation of toxicity controls as a result of exceedance of a numeric receiving water limitation is speculative.

The major categories of storm water dischargers are discussed below. These major categories are controlled through either individual NPDES storm water permits or through general NPDES storm water permits. It should be noted that the Industrial General Permit (IGP) and the Construction General Permit (CGP) do not require dischargers subject to these permits to monitor for aquatic toxicity. However, we include a discussion of the IGP and the CGP in this chapter because those general permits do require dischargers to implement control measures for toxic substances in storm water, even if they don’t require them to monitor for aquatic toxicity. Since the Provisions do not require storm water dischargers to monitor for aquatic toxicity it is unlikely that the Provisions will result in the implementation of additional control measures for toxicants in storm water. However, to inform decision-makers and the public, a list of possible methods of compliance are discussed below by category: industrial, municipal, Caltrans, and construction.

6.4.3.1 Industrial Storm Water

Industrial facilities such as factories, landfills, mines, steam generating electrical plants, hazardous waste facilities, transportation facilities with vehicle maintenance, larger sewage and wastewater plants, recycling facilities, and oil and gas facilities are typically required to obtain coverage under the General Industrial Storm Water Discharge Permit (Industrial General Permit or IGP). The IGP (Order 2014-0057-DWQ) implements the federally required storm water regulations in California for storm water associated with industrial activities discharging to waters of the United States. The IGP regulates discharges associated with 12 federally defined categories of industrial activities. Although the IGP does not require dischargers to monitor for aquatic toxicity, the IGP requires that all dischargers develop, implement, and retain onsite a site-specific Storm Water Pollution Prevention Plan (SWPPP) and the IGP requires that dischargers clearly describe the BMPs that are being implemented in the SWPPP. In addition to providing descriptions, dischargers must also describe who is responsible for the BMPs, where the BMPs will be installed, how often and when the BMPs will be implemented, and identify any pollutants of concern.

Several examples of BMPs that could mitigate or prevent toxicity are provided below. Dischargers are not required to use BMPs from the provided list, however dischargers should check their issued permits for any BMP requirements. For complete list and detailed description of additional BMPs please see the California Stormwater Quality Association (CASQA) BMP Handbook:
https://www.casqa.org/sites/default/files/BMPHandbooks/BMP_Municipal_Complete.pdf and the U.S. EPA 2008 Multi-Sector General Permit for Storm Water Discharges Associated with Industrial Activity (2008 MSGP).

Possible toxicity controls for industrial storm water dischargers include but are not limited to education, prevention and treatment. Education and pretreatment include practices such as employee environmental training and quality assurance and record keeping to ensure BMP implementation. Prevention methods include methods such as good housekeeping, preventative maintenance, spill prevention and response procedures, drum and container containment and storage pile containment, tank containment, fueling and liquid loading/unloading operations, runoff management techniques such as diversion, infiltration, reuse or containment, and elimination of unauthorized discharge. Treatment practices include practices such as coolant/oil recovery catch basin insert bags, detention facilities or diversion, porous pavers and infiltration systems, oil and sediment trap catch basins, and erosion and sediment controls.

6.4.3.2 Municipal Storm Water Phase I and Phase II

U.S. EPA defines an MS4 as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) owned or operated by a State, city, or town (and other municipal divisions). (40 CFR 122.26(b)(8)). Phase I MS4 permits are issued by the Regional Water Boards and require the discharger to develop and implement a Storm Water Management Plan/Program with the goal of reducing the discharge of pollutants to the maximum extent practicable.

The State Water Resources Control Board issued a General Permit for the Discharge of Storm Water from Small MS4s (Order No. 2003-0005-DWQ) to provide permit coverage for smaller municipalities, including non-traditional small MS4s, which include facilities such as military bases, public campuses, prison and hospital complexes. The Phase II Small MS4 General Permit covers Phase II permittees statewide. On February 5, 2013, the Phase II Small MS4 General Permit was re-adopted (Order 2013-0001-DWQ) and the new requirements became effective on July 1, 2013.

Several examples of BMPs that could mitigate or prevent toxicity are provided below. Dischargers are not required to use BMPs from the provided list, however dischargers should check their issued permits for any BMP requirements. For complete list and detailed description of BMPs please see appropriate Regional Water Board issued permit located on the State Water Recourses Control Board website, Phase I MS4 Permits

https://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_i_municipal.html

and the Small MS4s General Permit
https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/phsii2012_5th/order_final.pdf

Possible toxicity controls for municipal storm water dischargers include but are not limited to:

- Facility Pollution Prevention Plans
- Good Housekeeping
- Municipal Employee and Contracted Municipal Employee Training
- Vehicle and Equipment Washing Management
- Storm Drain Operation and Maintenance
- Public Reporting of Non-Storm Water Discharges and Spills
- Elimination of Illicit Connections and Illicit Discharges, including field sampling
- Trash Management
- Street and Road Cleaning and Maintenance

6.4.3.3 The California Department of Transportation (Caltrans)

Caltrans is responsible for the design, construction, management, and maintenance of the state highway system, including freeways, bridges, tunnels, Caltrans' facilities, and related properties. Caltrans is subject to the permitting requirements of Clean Water Act section 402(p). Discharge form Caltrans activities consist of storm water and non-storm water discharges from State owned rights-of-way.

The State Water Resources Control Board issues the Statewide Permit for Caltrans (Order No. 2012-0011-DWQ as amended by 2014-0006-EXEC, 2014-0077-DWQ, and 2015-0036-EXEC), which regulates all discharges from Caltrans MS4s, maintenance facilities, and construction activities.

Several examples of BMPs that could mitigate or prevent toxicity are provided below. Caltrans should check their issued permits for any BMP requirements. For complete list and detailed description of BMPs please see,

Caltrans Construction Site Best Management Practices (BMP) Manual
http://www.dot.ca.gov/hq/construc/stormwater/CSBMP-May-2017-Final.pdf

Possible toxicity controls for Caltrans storm water dischargers include but are not limited to:

- Hydroseeding
- Soil Binders
- Streambank Stabilization
- Earth Dikes/Drainage Swales & Lined Ditches
- Dentation Facilities or Diversion
- Infiltration Systems
- Clear Water Diversion
- Spill Prevention and Control
- Solid Waste Management
- Contaminated Soil Management
- Preservation of Existing Vegetation and instillation of Vegetative Treatment Area

6.4.3.4 Construction

Dischargers whose projects disturb one or more acres of soil, or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (2009-009-DWQ, as amended by 2010-0014-DWQ and 2012-0006-DWQ). Construction activity subject to this permit includes clearing, grading and disturbances to the ground such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility.

The CGP does not require dischargers to monitor for aquatic toxicity. However, dischargers are required to take measures to control or prevent toxicity. Several examples of BMPs that could mitigate or prevent toxicity are provided below. Dischargers are not required to use BMPs from the provided list, however dischargers should check their issued permits for any BMP requirements. For complete list and detailed description of BMPs please see the Stormwater Best Management Practice Handbook:

https://www.casqa.org/sites/default/files/BMPHandbooks/BMP_NewDevRedev_Complete.pdf

Possible toxicity controls for construction storm water dischargers include but are not limited to:

- Preservation of Existing Vegetation and instillation of Vegetative Treatment Area
- Velocity Dissipation Devices
- Sediment Control
- Sediment Basin
- Sediment Trap
- Dentation Facilities or Diversion
- Infiltration systems
- Material Delivery and Storage
- Contaminated Soil Management
- Concrete Waste Management

6.5 Reasonably Foreseeable Methods of Compliance for Nonpoint Source and other non-NPDES Dischargers

Often nonpoint sources are controlled through WDRs, management plans or, where impairments exist, through TMDLs. Regional Water Boards have developed many management practices that are carried out through various programs to control pollution from nonpoint sources. The California Nonpoint Source Program Implementation Plan 2014 – 2020 (State Water Resources Control Board et. al., 2015) discusses several programs that have been developed and are being implemented to address pollution from nonpoint sources including; irrigated lands, grazing lands, dairies, concentrated animal feeding operations, forests and timber lands, on-site waste treatment systems, and contaminated sediment remediation areas.

Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, this chapter will discuss possible toxicity controls. Because nonpoint sources include such a wide variety of activities and potential sources, the specific measures that comprise possible toxicity controls are numerous. What follows is a general description of the reasonably foreseeable methods of compliance and possible toxicity controls for general sectors of nonpoint sources listed below.

Unlike non-storm water NPDES dischargers, the Provisions do not stipulate specific monitoring requirements, and therefore monitoring requirements are not discussed here.

6.5.1 Required Use of the Test of Significant Toxicity Statistical Approach

The Provisions describe implementation for nonpoint source dischargers regulated pursuant to WDRs or equivalent documents in Section III.E (formerly Section IV.B.4). The Provisions do not require non-point source dischargers to conduct toxicity monitoring. Such monitoring requirements are left to the discretion of the Regional Water Boards. If the Water Boards require nonpoint source dischargers to conduct chronic or acute toxicity tests using test methods and Table 1 species as described in Section III.B.2 (formerly Section IV.B.1.b) of the Provisions, then nonpoint source dischargers must use the TST approach to analyze toxicity test data. A detailed discussion of the statistical approach, including current conditions, is provided in Section 5.3.1 of the Staff Report.

Nonpoint source dischargers must also report the results of the toxicity tests to the Water Boards as a pass or fail, and the percent effect. The software for using the TST approach is readily available and is already being used by several toxicity testing laboratories in California.

6.5.2 Numeric Toxicity Water Quality Objectives

As indicated previously, the implementation of toxicity controls as a result of exceedance of a numeric receiving water limitation is speculative. Sections II.C.1 and II.C.2 (formerly Sections III.B.2.a and III.B.2.b) of the Provisions establish numeric objectives for chronic and acute toxicity, which apply to all inland surface waters, enclosed bays and estuaries in the state with aquatic life beneficial uses. A detailed discussion of the numeric toxicity water quality objectives is provided in Section 5.1.1 of the Staff Report.

Nonpoint source dischargers are regulated under existing WDRs or equivalent permits, requiring appropriate controls. WDRs may specify certain conditions under which, or areas where, the discharge of waste or certain types of waste are prohibited. The Water Boards often include receiving water limitations based on water quality objectives and associated monitoring for compliance with those limitations. Staff do not expect the numeric water quality objectives to cause an increase in the number of waters that are listed as impaired for toxicity. While a net increase in toxicity detections is not expected, it is possible that a discharger may be identified as exceeding a numeric toxicity receiving water limitation. If a toxic event occurred where a discharger caused or contributed to that toxicity, the water boards may require, or the discharger may elect to take, steps to prevent or reduce that toxicity.

To inform decision-makers and the public, a list of possible toxicity controls are discussed below by category: agriculture, grazing, forestry, recreational boating and marinas, hydromodification, abandoned mine drainage, and dredge and fill.

6.5.3 Agriculture

Agriculture includes activities such as growing row crops or orchards. The primary agricultural nonpoint source pollutants associate with toxicity are nutrients, sediment, animal waste, pesticides, and salts. (State Water Resources Control Board et. al., 2015). Individual nutrient compounds or the sum of these nutrient compounds can be toxic to aquatic life directly or indirectly. Indirect toxic effects of biostimulatory substances include algal blooms, which can affect the pH or the amount of dissolved oxygen available, or which can result in the release of other toxins, such as cyanotoxins, into the water body. Sediment that is stirred up can expose toxic pollutants to aquatic life in surface water. This water matrix can be any agriculture water way, which may connect to non-agriculture water bodies. Individual pesticides (including herbicides and algicides) or the combination of pesticides from application runoff can also have adverse effects on aquatic life.

For agriculture, potential methods of compliance include, but are not limited to:

- Structural controls to contain or divert runoff or facility wastewater away from surface waters.
- Nutrient management, pesticide management, and irrigation water management that minimize runoff containing potential toxicants.
- Creating vegetative buffer and retention ponds.
- Public outreach to reduce the overabundance of fertilizer application.
- Changing pesticide use.
- Utilizing erosion control.
- Water quality monitoring.
- Edge-of-field bioreactors for nitrate removal.

6.5.4 Grazing

Grazing includes activities associated grazing livestock. The primary nonpoint source pollutant associated with toxicity is nutrients from animal wastes (State Water Resources Control Board et. al., 2015). Individual nutrient compounds or the sum of these nutrient compounds from animal waste can be toxic to aquatic life directly, or through the effects of biostimulatory substances. Sediment erosion from over grazing is a major cause in the degradation of surface water. Toxic pollutants that are free-floating or bound to sediment particles can have adverse effects on aquatic life.

For grazing possible toxicity controls include, but are not limited to:

- Manure removal projects.
- Restricting areas for grazing and rangeland activities by rotationally grazing livestock in sensitive areas, using appropriate fencing, and providing livestock stream crossings.
- Utilizing structural controls to contain or divert runoff away from surface waters.
- Locating salt, shade, and alternative drinking sources away from water ways.
- Maintaining adequate riparian buffer strips.
- Minimization of bare soil and use of cover crop.

6.5.5 Forestry (including fire recovery areas)

Forestry (silviculture) includes activities involving timber harvests, forest management, and forest regeneration. The primary nonpoint source pollutants associate with toxicity are increases in sediment concentrations, increases in water temperatures, depletion of dissolved oxygen, and increases in concentrations of chemicals from fertilizers and pesticides (State Water Resources Control Board et. al., 2015). Sediment that is stirred up can expose surface water to toxic pollutants that are free-floating or bound to sediment particles. These toxic pollutants from sediment can then have adverse effects on aquatic life. Individual pesticides and the combination of pesticides can have adverse effects on aquatic life. Pesticides can enter surface water through run-off from application.

Possible toxicity controls for forestry include, but are not limited to:

- Implementing preharvest planning.
- Revegetation of disturbed areas or site preparation and forest regeneration, particularly in areas that have steep slopes, highly erodible soils, or when the site is near a water body.
- Creating and maintaining riparian buffer strips.
- Creating streamside management areas to protect against soil disturbance and reduce sediment and nutrient delivery to waters from upland activities.
- Implementing forest chemical management plans, including for pesticide use.
- Limiting timber harvest to drier months.
- Utilizing erosion protection and control methods.
- Decommissioning or proper maintenance of timber roads for erosion control.

6.5.6 Recreational Boating and Marinas

This category refers to activities related to boat and marina storage, use, and maintenance. Operation and maintenance activities produce paint dust, paint chippings, oil and grease, fuel, detergents, and sewage (Nonpoint Source Control Branch, U.S. EPA, 2001). The primary nonpoint source pollutants sources associate with toxicity are marina flushing, fueling stations, sewage facilities, waste management facilities, operations and maintenance, liquid material leaks, petroleum leaks, and boat cleaning and maintenance.

For recreational boating and marinas, possible toxicity controls include, but are not limited to:

- Designing fuel stations to provide fuel containment equipment.
- Installing waste management facilities for disposal of solid wastes, and liquid materials at new and expanding marinas.
- Maintaining sewage pump-out facilities at marinas.
- Providing and maintaining proper transfer and disposal of fuels and any solid or liquid wastes used for cleaning, maintenance, and repair of boats.
- Minimizing the use of potentially harmful hull cleaners and bottom paints for boats.
- Performing hull cleaning on land.

- Applying non-biocidal hull paints.

6.5.7 Hydromodification

Hydromodification refers to alterations in natural watershed hydrology associated with changes in land use or cover (SCCWRP, 2013). Hydromodification can refer to channel modification in rivers or streams, urbanization, dam construction, and erosion of streambanks and shorelines. These structures and modifications drive changes in the physical environment of streams, rivers, riparian zones and estuaries through changes such as sediment loads, stream flow, or unnecessary inundation (State Water Resources Control Board et. al., 2015). Some of these activities may require a dredge and fill 401 certification.

For hydromodification, possible toxicity controls include, but are not limited to:

- Increase or maintain flow of water body though the removal of dams and other diversions.
- Creating wetland and vegetated treatment systems.
- Creating riparian buffers.
- Removal of concrete from channels to allow the soil to uptake nutrients from the water instead of collecting in the water matrix.
- Managing invasive species, aquatic weed and algal blooms.
- Installing large woody debris or other structures to capture sediment and create aquatic habitat.

6.5.8 Dredge and Fill (401 certification program)

Dredge is material excavated or dredged from water, and fill is material used for the purpose of replacing water with land. The CWA lists dredged material as a pollutant and states no dredge or fill material shall be used if the material “causes or contributes…to the violations of any applicable State Water Quality Standard.” Dredge and fill activities can cause pollution and lead to aquatic toxicity through construction activities that may disturb toxic substances in sediment and through the loss of wetlands, which can have a detrimental impact on water quality.

For dredge and fill, possible toxicity controls include, but are not limited to:

- Reducing hydromodification activates
- Reducing wetland destruction
- Employing sediment controls to reduce sediment in water
- Ensuring proper disposal of dredged material
- Ensuring fill material does not contain toxic substances (i.e., pesticides, metals, etc.)
- Ensuring dredging is not done in areas susceptible to mercury methylation

6.5.9 Abandoned Mine Drainage

Abandoned mines, which could include areas that are natural sources of an element, such as mercury or lead, produce abandoned mine drainage due to rainfall. The drainage can include acid mine drainage, arsenic, copper, mercury, or lead (State of California, 2017).

For abandoned mine drainage, possible toxicity controls include, but are not limited to:

- Source control as either removal of material, or specific treatments.
- Runoff reduction including engineering controls and BMPs.
- Removal of chemical-containing drums.
- Employee and public risk abatement education.
- Reconstruction of streams and riparian buffers.
- Erosion control efforts

7 ENVIRONMENTAL EFFECTS & CHECKLIST

7.1 Introduction

In accordance with Public Resources Code, section 21080.5, subdivision (c), the Water Boards' Water Quality Control/208 Planning Program has been certified as an exempt regulatory program by the Secretary for Natural Resources (Cal. Code Regs., tit. 14, § 15251, subd. (g); id., tit. 23, § 3775). The certification means the Water Boards are exempt from having to develop an EIR because the environmental analysis is contained in a Substitute Environmental Document (SED). The California Code of Regulations, title 23, chapter 27, contains the Water Boards' regulations for implementing CEQA (Pub. Resources Code, § 21000, et seq.). The Water Boards' procedural requirements for certified regulatory program incorporates the CEQA Guidelines found in the California Code of Regulations, title 23, commencing with section 15000. (Cal. Code Regs., tit. 23, §3720.) The State Water Board's SED must contain an environmental analysis of its proposed action. The Staff Report, which contains the SED, is being used to satisfy this requirement.

The Water Boards' certified regulatory program must still comply with CEQA's overall objectives to: inform the decision makers and the public about the potentially significant environmental effects of a proposed project; identify ways that significant adverse environmental impacts may be mitigated; and prevent significant, avoidable adverse environmental impacts by changing the proposed project or requiring mitigation measures. There are certain guiding principles that are contained in the CEQA Guidelines that help to inform the Water Board's certified regulatory process and preparation of the SED:

> Forecasting: Drafting the environmental analysis necessarily involves some degree of forecasting. While foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can (Cal. Code Regs., tit. 14, § 15144).
>
> Speculation: If, after thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact (Cal. Code Regs., tit. 14, § 15145).
>
> Specificity: The degree of specificity required in the environmental analysis will correspond to the degree of specificity involved in the underlying activity which is described in the environmental document (Cal. Code Regs., tit. 14, § 15146.)
>
> Standards for Adequacy: The environmental analysis should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of the analysis is to be reviewed in the light of what is reasonably feasible. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full

disclosure (Cal. Code Regs., tit. 14, § 15151).

Per the requirements of the State Water Board's certified regulatory program (Cal. Code Regs., tit. 23, section 3777, subds. (b)(2)-(b)(4).), the environmental analysis (Chapters 6 through 9) includes:

- An identification of any significant or potentially significant adverse environmental impacts of the project;
- An analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts; and
- An environmental analysis of the reasonably foreseeable methods of compliance, including:
  - An identification of the reasonably foreseeable methods of compliance with the project;
  - An analysis of any reasonably foreseeable significant adverse environmental impacts associated with those methods of compliance;
  - An analysis of reasonably foreseeable alternative methods of compliance that would have less significant adverse environmental impacts; and
  - An analysis of reasonably foreseeable mitigation measures that would minimize any unavoidable significant adverse environmental impacts of the reasonably foreseeable methods of compliance.

This section of the Staff Report contains the Environmental Checklist and identifies and evaluates the potential environmental impacts that may arise from the project and the reasonably foreseeable methods of compliance. (Cal. Code Regs., tit. 23, § 3777(b).)

7.2 Impact Methodology & Level of Analysis

Any potential environmental impacts associated with the Provisions depend upon the specific compliance methods selected by the complying permittee, some of whom would be public agencies subject to their own CEQA obligations (see Pub. Resources Code, § 21159.2).

Consistent with Public Resources Code section 21159 and the Water Boards' certified regulatory program, the document does not engage in speculation or conjecture, but rather considers the potential environmental impacts of the Provisions and reasonably foreseeable methods of compliance, the feasible mitigation measures, and feasible alternatives (including alternative methods of compliance) which would meet the project objectives and avoid or reduce the potentially significant impacts of the Provisions.

The State Water Board does not specify the actual methods of compliance by which permittees choose to comply with the Provisions. The specificity of the activity described in this Staff Report related to reasonably foreseeable methods of compliance or possible toxicity controls is of a general, programmatic nature and the level of analysis of the potentially significant adverse environmental effects is commensurate with that level of detail.

The State Water Board is the lead agency for the Provisions, while the responsible agencies identified in Section 1.5 (formerly Section 1.6) of the Staff Report (Intended Use of the Staff Report by Agencies) may be the lead agency for CEQA compliance for approval and implementation of a toxicity control project. At the time of approval of a specific project, a project-level environmental analysis may be performed by the local approval agency.

Project-level impacts will necessarily vary depending on the choice of the specific project and the size, location, and type of discharger and the environmental resources in and around the project site. It would be speculative to estimate the specific impacts of project-specific toxicity controls. It is possible that, at a specific site with particularly sensitive environmental resources, toxicity controls could cause potentially significant impacts as compared to baseline conditions. Since it is speculative to estimate the type, size, and location of any particular possible toxicity control (e.g., type of construction activities and type of resources adversely affected by those activities), this evaluation makes no attempt to quantify the impacts associated with implementation or maintenance of a particular toxicity control.

The potential environmental impacts from monitoring vary depending on the baseline monitoring requirements, the on-site resources, and the site location. These conditions vary from discharger to discharger across the state. Some non-stormwater NPDES dischargers without current monitoring requirements for acute or chronic toxicity may need to begin conducting routine monitoring if they are determined to have reasonable potential according to Section III.C.3 (formerly Section IV.B.2.c) of the Provisions, or if they are a POTW discharger authorized to discharge at a rate equal to or greater than 5 MGD and are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020). Certain non-stormwater NPDES dischargers may need to increase their monitoring frequency for chronic toxicity, while other dischargers will see no change in their acute or chronic toxicity monitoring requirements, and possibly less frequent monitoring requirements. Unlike non-storm water NPDES dischargers, the Provisions do not stipulate specific monitoring requirements for stormwater and non-point source dischargers, and therefore the environmental impacts of monitoring requirements are not discussed here. For non-stormwater NPDES dischargers that will be required to increase their routine monitoring frequency for acute or chronic toxicity, the potential environmental impacts will depend on the availability of on-site laboratory facilities to conduct toxicity testing, the distance the discharger must transport samples to a laboratory for analysis, and if transportation of samples can be done in conjunction with other samples that must also be transported to laboratories for analysis to determine compliance with other permit requirements (e.g., chemical-specific effluent limitations etc.).

Within each of the subsections of Section 7.5 below, this document evaluates the potentially significant impacts of the Provisions for each subject resource area. The implementation alternatives evaluated in Chapter 8 of the Staff Report are evaluated on a statewide level for impacts for each resource area. Project-level analysis is expected to be conducted by the appropriate public agencies prior to implementation of specific projects. The environmental analysis in this document assumes that the specific projects would be designed, installed, and maintained following all applicable state and local laws, regulations, and ordinances. The analysis does not include actions that would already be required by other existing laws or policy.

7.3 Environmental Setting

CEQA directs that the environmental setting normally be used as the baseline for determining significant impacts of a proposed project (Cal. Code Regs., tit.14, § 15125, subd. (a)). Chapter 4 and Appendix C present a broad overview of the environmental setting for the State of California related to the Provisions. As such, the environmental setting and baseline for determining impacts is presented at a general level as each of the Water Boards and permittee may address toxicity with a range of treatment and institutional controls. Section 7.5 of the Staff Report, arranged by resource type (the Environmental Checklist), presents specific environmental setting information relevant to the assessment of environmental impacts of the Provisions.

Throughout California, basin plans contain water quality objectives and NPDES permits contain effluent limitations for several toxic substances that may impact water quality. However, there are known and unknown toxic substances, for which water quality objectives and effluent limitations do not exist. In addition, toxicity may result from aggregate toxic effects of a mixture of pollutants, even if individual toxicants are within established limits. Aquatic toxicity tests are used in a variety of regulatory and nonregulatory applications to estimate the toxicity of effluent or ambient water. Aquatic toxicity testing provides an indicator for potential adverse effects on receiving water quality and a level of assurance that effluent discharged into ambient surface waters do not cause or contribute to toxicity and impact aquatic life beneficial uses.

7.4 Summary of Programmatic Potential Environmental Impacts

Chapter 5 contains a detailed description of the Provisions. Chapter 6 contains a detailed description of the reasonably foreseeable methods of compliance for the provisions and possible toxicity controls. The reasonably foreseeable methods of compliance and possible toxicity controls are discussed for the discharger types that may be impacted by the Provisions: non-storm water NPDES dischargers, storm water NPDES dischargers, and non-point source dischargers.

The major category of reasonably foreseeable methods of compliance for all non-stormwater NPDES dischargers was identified as: (1) an increase in monitoring, testing, and laboratory analysis.

The method of compliance for dischargers that must report the results of toxicity tests to the Water Boards using the TST as a pass or fail, and the percent effect, is to conduct the data analysis using the TST. The software for using the TST approach is readily available and is already being used by several toxicity testing laboratories in California. Therefore, there will be no associated impacts, and this Chapter does not include further discussion on this method of compliance.

Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, Chapter 6 discusses possible toxicity controls. Possible toxicity controls for all dischargers were identified as: (1) institutional controls which reduce or minimize the quantity of toxicants used, or that come into a facility in the influent; and (2) treatment or structural controls, including facility upgrades, to prevent, reduce, or remove toxicity.

The Water Board is not required to analyze the environmental impacts from the possible toxicity controls because they are not reasonably foreseeable methods of compliance and are instead speculative possibilities. For purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, Chapter 7 includes a discussion on the potential impacts from the possible toxicity controls.

Section 7.5 contains the Environmental Checklist and the environmental analysis (by resource type) of the proposed Provisions, reasonably foreseeable methods of compliance, and possible toxicity controls, and includes a discussion of the environmental effects.

The resource areas that may have potentially significant impacts are:

- Air Quality
- Agricultural and Forest Resources
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Noise and Vibration
- Public Services
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems

7.4.1 Analysis of Reasonably Foreseeable Methods of Compliance and Possible Toxicity Controls

The environmental impact analysis evaluates the potential impacts associated with the three major categories of reasonably foreseeable methods of compliance and possible toxicity controls outlined above. Institutional controls involve measures such as educational and toxicity minimization programs, pollution prevention plans and good housekeeping practices.

Institutional controls do not require the installation of physical structural controls or earth moving activities and therefore are not expected to have any adverse impacts on the environment.

Appendix H lists examples of TREs in California and other states. These examples illustrate the various measures that a discharger can take to eliminate toxicity, such as pretreatment requirements and public outreach, besides facility upgrades. Furthermore, treatment upgrades do not necessarily require expansion of a facility's footprint, and the environmental impacts associated with improvements to infrastructure may be minimal or may be consistent with the existing baseline as they occur within the existing boundaries of a facility.

As described in Chapter 6, some of the methods of compliance for non-storm water NPDES dischargers are related to monitoring. In particular, the Provisions provide clear direction to non-storm water NPDES dischargers on the number of tests needed for species sensitivity screening, the number of species to be used, and the timing for the species sensitivity screening tests. Non-storm water NPDES discharges can comply with the reasonable potential requirements in the Provisions by providing all toxicity test data and data analysis generated within five years prior to permit issuance, reissuance, renewal, or reopening (to address the toxicity requirements) to the Regional Water Board, and by possibly providing additional testing. The method of compliance for those with less frequent monitoring than that required by the Provisions would be to conduct the required monitoring (routine monitoring and MMEL compliance monitoring). Non-storm water NPDES discharges would comply with the Provisions by initiating a TRE whenever there are two or more violations in a single calendar month, or within two successive calendar months.

Monitoring is a multi-stage process, with multiple components. In the context of toxicity testing, there are three components to a single monitoring event: the collection of samples, the transportation of the samples, and the analysis of the samples. Potential impacts related to a possible increase in monitoring, testing, and laboratory analysis are considered here as possible direct impacts of the Provisions and are treated separately from potential impacts from the installation of treatment controls.

The possibility that any given discharger would implement a specific toxicity control as a method of complying with toxicity effluent limitations, toxicity reduction evaluations, receiving water limitations or other requirements in the Provisions is speculative. Whether a discharger would choose to implement additional toxicity controls as a result of the Provisions to address toxicity would depend, in part, on whether the discharger already needs to comply with existing toxicant-specific or existing aquatic toxicity monitoring requirements, effluent limitations, or receiving water limitations. Whether a discharger chooses to implement additional toxicity controls may also depend on the nature, type, and persistence of any toxicity detections, and whether the cause of the toxicity or the identity of the toxicant is determined.

The Water Boards do not mandate the manner of compliance (see Water Code section 13360(a)), so any discharger that chooses to implement a toxicity control is free to select any particular toxicity control or combination of toxicity controls. If a discharger chooses to implement an additional toxicity control, the discharger's selection of one or more particular toxicity controls would depend on the type of facility, the type of toxicity controls already in place at the facility, and the quality of the existing effluent of the discharger. The type of toxicity control selected by the discharger could also depend on whether the cause of the toxicity (e.g., malfunctioning equipment) or the toxicant (e.g., identification of high copper amount in the effluent) are identified. It is more likely that dischargers would select toxicity controls that are less expensive and have lower environmental impact (e.g., institutional toxicity controls or optimization of existing structural toxicity controls) rather than toxicity controls that are more expensive and have higher environmental impacts (e.g., new structural toxicity controls). Ultimately, however, it is unclear which toxicity control would be selected.

Therefore, the possibility that any particular discharger might implement additional toxicity controls as a result of the Provisions is speculative. To the extent that a discharger does choose to implement additional toxicity controls as a result of the Provisions, the possibility that the discharger would choose to implement any particular toxicity control, or any combination of particular toxicity controls, out of the many different types of toxicity control(s) is also speculative.

Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, this chapter includes a discussion on the impacts from the construction and operation and maintenance of possible toxicity controls.

Given that aquatic toxicity testing, by its very nature, is intended to detect the effects of unknown pollutants, or aggregate effects of pollutant mixtures, it would be speculative of the State Water Board to attempt to determine which non-storm water NPDES dischargers, if any, would choose to implement additional toxicity control and what those additional toxicity controls might be. It is speculative to estimate the type, size, and location of any particular toxicity control (e.g., whether construction activities occur within the facility itself, outside the facility but within the existing facility footprint, or would require an expansion of the facility footprint).

Additionally, the appropriate time to evaluate potential impacts would be during the development of the project-specific environmental documentation. This evaluation includes a qualitative assessment of the potential impacts associated with construction from facility upgrades or toxicity controls. Likewise, if a discharger chooses to implement a toxicity control, this evaluation includes a qualitative assessment of the potential impacts associated with operation and maintenance of that toxicity control.

In order to aid the qualitative assessment of potential impacts, staff reviewed the environmental documentation for five POTW discharger upgrade projects that broadly capture the size, types, and locations of upgrades that might be considered in order to address toxicity. The five projects include four EIRs and two Initial Study (IS) / Mitigated Negative Declarations:

1) City of Shasta Lake Wastewater Treatment Facility Upgrade Project – IS (City of Shasta Lake, 2014)
2) Kirkwood Wastewater Treatment Plant Upgrade – EIR (Alpine County, 2002)
3) Sacramento Regional County Sanitation District (Regional San) EchoWater Project – EIR (Sacramento Regional County Sanitation District, 2014)
4) City of Merced Wastewater Treatment Plant Expansion Project – EIR (City of Merced, 2006)
5) City of Firebaugh Wastewater Treatment Plant Upgrade – IS (City of Firebaugh, 2017)

Project Characteristics

City of Lake Shasta

The City of Lake Shasta's project involved the installation of new facilities to provide tertiary treatment of wastewater with no increase in the design capacity of 1.3 MGD. The wastewater treatment plant (WWTP) was previously an advanced secondary facility, and due to dilution requirements for discharges to Chum Creek, had an effective treatment capacity of 0.83 MGD. The new facilities were designed to ensure compliance with the effluent limitations for ammonia, copper, dichlorobromomethane, nitrate, nitrite, pH, and zinc, and also to increase the effective treatment capacity to 1.3 MGD. The project entailed construction of two new activated sludge basins; installation of a fourth mixed liquor screw pump; construction of a third secondary clarifier; establishment of a lined secondary equalization basin; construction of a deep bed filtration facility; installation of an ultraviolet disinfection system; installation of a new discharge pipeline; construction of a cascade re-aeration facility; and, replacement of the existing outfall.

Kirkwood

The WWTP serving the Kirkwood community is operated by the Kirkwood Meadow Public Utility District. The proposed project evaluated by the EIR included Kirkwood Mountain Resort's draft specific plan, their proposed ski area mountain master plan, and WWTP upgrades and expansion. The WWTP portion of the project included expanding the facility to accommodate a maximum monthly flow of 0.19 MGD from the previously estimated flows of 0.09 – 0.1 MGD; installation of a membrane bioreactor process; construction of 5 new absorption beds; and installation of a second 320 kilowatt generator.

EchoWater Project

The Sacramento Regional WWTP (also known as Regional San) is permitted to treat 181 MGD but currently treats approximately 141 MGD. No expansion in capacity was proposed.

Regional San was required to reduce total nitrogen and ammonia levels in its effluent and also install filtration treatment for pathogen removal. The EIR evaluated potential environmental impacts for the maximum development anticipated, although some project components may not be developed. Specific project components evaluated were: primary effluent pumping station and primary effluent channel; biological nutrient removal facility; return activated sludge pumps; nitrifying side-stream treatment facility; emergency storage basins; carbonaceous oxygen tank conversion (potential); filtration facility; filter influent pump station; disinfection facilities; lined dedicated land disposal basins and solid storage basins; odor control facility; decommission chlorine gas, sulfur dioxide gas, and cryogenic plant (potential); new effluent conduit (potential); and landside outfall facility improvements. The EIR also evaluated potential environmental impacts for improvements deemed necessary to support the improved treatment operations: temporary contractor staging/laydown, construction management trailers, and parking areas; temporary onsite scraper and construction roads; extension of onsite uses to serve new facilities (e.g., water, storm drainage); relocation of corrective action program facilities; expansion of main switchgear/substation; security features; new and improved roadways; utility relocations (to clear new facility footprints); storm water pump station modifications (if needed); relocated heavy equipment maintenance facilities; grit landfill removal; and concrete batch plant (potential), including pugmill (potential).

City of Merced

The City of Merced project entailed increasing the WWTP’s permitted capacity from 10 MGD to 20 MGD and upgrading the facility from secondary to tertiary level treatment. Facility upgrades included tertiary filtration, ultra-violet disinfection, effluent re-aeration, as well as solids dewatering and stabilization.

City of Firebaugh

The City of Firebaugh project involved installing an extended aeration activated sludge system to produce effluent with a quality that meets existing limits (specifically Biochemical Oxygen Demand and Total Suspended Solids) and, if desired, would be suitable for tertiary treatment to meet recycled water standards. The project is also designed for future configuration to incorporate a denitrification system, if it is ever needed.

Environmental Impacts Identified for Facility Upgrades

Nearly all of the potentially significant environmental impacts identified in the environmental documents were found to be less than significant with mitigation. The cities of Shasta Lake and Firebaugh found that all potentially significant impacts could be reduced to less than significant levels and subsequently adopted a Mitigated Negative Declaration (City of Shasta, 2014; City of Firebaugh, 2017).

Alpine County determined that the overall Kirkwood project would have significant adverse impacts on wildlife resources and visual/aesthetic resources, even with mitigation (Alpine County, 2002). These impacts, however, are associated with the development of the resort and ski area and are not attributable to the expansion and upgrade of the WWTP.

The only significant and unavoidable impact identified for the EchoWater project was construction-related traffic impacts. This determination was made based on the uncertainty surrounding the feasibility of the identified mitigation measures (development of a traffic management plan and an increase in turn signal times at intersections) (Sacramento Regional County Sanitation District, 2014).

The City of Merced determined that there would be significant and unavoidable impacts to open space and important farmland, due to the conversion of 20 acres of farmland needed for the WWTP expansion (City of Merced, 2006). This impact is due to the expanded capacity of the WWTP and not a result of treatment upgrades. The EIR also found several significant and unavoidable secondary effects associated with removing an obstacle to urban growth. These impacts are also associated with the increase in capacity of the WWTP.

Based on the review of these environmental documents, it appears that in most situations, potentially significant environmental impacts identified in the review process for WWTP upgrades can be reduced to less than significant levels with mitigation. Significant and unavoidable effects that were identified were unrelated to the WWTP (Kirkwood) or were a result of WWTP expansion (City of Merced), not the treatment upgrades. Even the traffic impacts identified in the EchoWater project as significant and unavoidable may ultimately be reduced by the identified mitigation measures to less than significant levels. The traffic management plan was developed after the environmental review process had been concluded. The uncertainty of the effectiveness of potential mitigation measures that would be developed as part of a traffic management plan is what lead to the determination of a potentially significant impact. The analysis concluded that if the final traffic management plan does not reduce impacts to traffic to less than significant levels, the impact would be temporary in nature.

Facility upgrades indirectly resulting from the implementation of the Provisions are expected to be rare, if they happen at all. Moreover, it would be speculative to estimate the type, size, and location of these construction activities. The evaluation of environmental impacts from the Provisions and reasonably foreseeable methods of compliance includes an assessment of a representative sample of dischargers and the associated environmental documents prepared for projects involving facility upgrades and is included in the Environmental Checklist.

7.5 ENVIRONMENTAL CHECKLIST

7.5.1 Aesthetics

7.5.1.1 Regulatory Background

Federal

Federal policies and regulations related to visual resources, primarily the Highway Beautification Act (HBA) of 1965 (P.L. 89-285, Regulations 23 Code of Federal Regulations [CFR] 750, 23 CFR 751, 23 CFR 752), apply only to federal-aid highways (National Highway System or National System of Interstate and Defense Highways). The State of California entered into an agreement with the US Secretary of Transportation "for carrying out National Policy relative to control of outdoor advertising in areas adjacent to the National System of Interstate and Defense Highways and the Federal-Aid Primary System" on February 15, 1968. The HBA called for the control of outdoor advertising, including removal of certain types of signs, along the nation's growing Interstate Highway System and the existing federal-aid primary highway system. It also required certain junkyards along Interstate or primary highways to be removed or screened and encouraged scenic enhancement and roadside development. Although there may be situations where regulated facilities are located near federal-aid highways, State Water Board staff does not anticipate that any activities related to the HBA will occur. Therefore, further discussion of federal regulations is not required.

State

California Scenic Highway Program

California's Scenic Highway Program was created by the California Legislature in 1963 and is managed by the California Department of Transportation (Caltrans). The goal of this program is to preserve and protect scenic highway corridors from changes that would affect the aesthetic value of the land adjacent to highways. A highway may be designated "scenic" depending on how much of the natural landscape travelers can see, the scenic quality of the landscape, and the extent to which development intrudes on travelers' enjoyment of the view (Caltrans 2008).

The State Scenic Highway System includes highways that are eligible to become, or designated as, official scenic highways; and includes a process for the designation of official State or County Scenic

Title 24 Outdoor Lighting

The California Building Standards Code (Cal. Code Regs., Title 24) regulates lighting characteristics, such as maximum power and brightness, shielding, and sensor controls to turn lighting on and off (Cal. Code Regs., Title 24, Part 6, Sections 130.2 and 140.7). Different lighting standards are set by classifying areas by lighting zone. The classification is based on population figures of the 2000 Census. Areas can be designated as LZ0 (very low – undeveloped areas of government designated parks, recreation areas, and wildlife preserves), LZ1 (low – developed portions of government designated parks, recreation areas, and wildlife preserves), LZ2 (moderate – rural areas), LZ3 (moderately high – urban areas), or LZ4 (high) (Cal. Code Regs., Title 24, Part 1, Section 10-114). Lighting requirements for LZ0 and LZ1 are stricter to protect the areas from new sources of light pollution and light trespass.

Local

General Plans

All cities and counties within California are required to have developed general plans that set forth the goals, policies and directions they will take in managing their futures. Coastal communities are also required to develop Local Coastal Programs, pursuant to the California Coastal Act, which are commonly included in their general plans. General plans must contain at least seven elements: land use, circulation, housing, conservation, open space, noise, and safety. Cities and counties in the San Joaquin Air Pollution Control District must also address air quality in their general plans. Cities and counties that have identified disadvantaged communities must also address environmental justice in their general plans, including air quality.

Scenic resources are statutorily identified to be included in the land use and open space elements of general plans. Scenic resources are also closely related to statutory requirements of all of the other required elements, except for the safety element.

Ordinances

Cities and counties have adopted local ordinances to implement portions of their general plans. Sacramento County regulates signs along scenic corridors identified in their general plan's circulation element (Sac. Co. Zoning Code, Section 5.10.7).

7.5.1.2 Potential Impacts

Note on Formatting: The October 19, 2018 Draft Staff Report used tables with check boxes to display potential impacts for each category. In this version of the Staff Report, the tables are removed and replaced with narrative text in a list format. This formatting change is intended to facilitate text-to-audio applications. Any changes in the description of the issues or in the findings of potential impacts from the October 19, 2018 Draft Staff Report are reflected as underline additions and strikeout deletions.

Except as provided in Public Resources Code section 21099, would the project:

a) Have a substantial adverse effect on a scenic vista?

   The project would have a **less than significant impact.**

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

The project would have a **less than significant impact.**

c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

The project would have a **less than significant impact.**

d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

The project would have a **less than significant impact.**

7.5.1.3 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Monitoring is not expected to directly impact aesthetics (items a-d). Any potential increase in the frequency of monitoring will have no effect on aesthetics. No mitigation is required.

Potential Impacts from Structural Control Construction

Of the project-specific environmental documents reviewed, the impacts to aesthetics due to treatment plant upgrades were found to be mostly less than significant or have no impact in the environmental analyses reviewed by State Water Board staff. Alpine County determined that the overall Kirkwood project would have significant adverse impacts on visual/aesthetic resources, even with mitigation (Alpine County, 2002). These impacts, however, are associated with the development of the resort and ski area and are not attributable to the expansion and upgrade of the WWTP.

While remote, existing wastewater treatment/industrial facilities may need to be upgraded in order to correct conditions where toxicity has been detected in their discharge. However, this is only likely to occur in previously developed areas. Therefore, it is unlikely that the aesthetics of the natural environment or scenic vistas would be adversely affected by improvements to existing infrastructure (item a). In addition, the selection of toxicity controls is not expected to create a change in the lighting requirements of existing facilities (item d), therefore, impacts are anticipated to be less than significant.

Land alterations may occur if reasonably foreseeable methods of compliance are employed to prevent erosion and the subsequent discharge of wastewater into nearby waterbodies. This may cause minimal land alteration in the way of berm or catch basin construction (items b and c). Growth of new vegetation would lessen the visual changes in the landscape. Therefore, it is unlikely the aesthetics of the natural environmental would be a significant impact.

Potential Impacts from Operation and Maintenance Activities

Operation and maintenance activities (O/M) from the installation of toxicity controls would not result in a change to the aesthetics of the natural environment or scenic vistas (items a-d). O/M may occur inside buildings, or within previously developed area. In addition, O/M would not be expected to create a change in the lighting of existing facilities. Therefore, impacts are anticipated to be less than significant.

Summary

Compliance with the Provisions is anticipated to have a less than significant impact on aesthetics.

7.5.2 Agricultural and Forest Resources

7.5.2.1 Regulatory Background

Federal

Farmland Protection Policy Act

The purpose of the Federal Farmland Protection Policy Act is to minimize federal actions leading to the conversion of farmland to nonagricultural uses by ensuring that federal programs are administered in a manner compatible with state government, local government, and private programs designed to protect farmland. No federal actions are expected to affect farmland in relation to the proposed Provisions, so this policy is not addressed further.

State

California Important Farmland Inventory System and Farmland Mapping and Monitoring Program

The California Department of Conservation, Office of Land Conservation, maintains a statewide inventory of farmlands. These lands are mapped by the Division of Land Resource Protection as part of the Farmland Mapping and Monitoring Program (FMMP). The maps are updated every two years with the use of aerial photographs, a computer mapping system, public review, and field reconnaissance. Farmlands are divided into the following five categories based on their suitability for agriculture:

- Prime Farmland—land that has the best combination of physical and chemical characteristics for crop production. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed.
- Farmland of Statewide Importance—land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production.
- Unique Farmland—land that does not meet the criteria for Prime Farmland or Farmland of Statewide Importance, but that has been used for the production of specific crops with high economic value.
- Farmland of Local Importance—land that is either currently producing crops or has the capability of production, but that does not meet the criteria of the categories above. This farmland category is determined by each county's board of supervisors and a local advisory committee.
- Grazing Land—land on which the vegetation is suited to the grazing of livestock.

The categories of Prime Farmland, Farmland of Statewide Importance, and Unique Farmland, together, are defined as "agricultural land" or "farmland" by the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] Section 21060.1 (a) and the CEQA Guidelines Appendix G, II [a]). Other categories used in the FMMP mapping system are "urban and built- up lands," "lands committed to nonagricultural use," and "other lands" (land that does not meet the criteria of any of the other categories).

California Land Conservation Act of 1965

The California Land Conservation Act of 1965, commonly known as the Williamson Act (California Government Code Section 51200 et seq.), enables local governments to enter into contracts with private landowners for the purpose of promoting the continued use of the relevant land in agricultural or related open space use. In return, landowners receive property tax assessments that are based on farming and open space uses instead of full market value.

Local governments receive an annual subvention (subsidy) of forgone property tax revenues from the state via the Open Space Subvention Act of 1971. Amendments to the California State Budget Act of 2009 greatly reduced the Williamson Act Subvention payments, but the Williamson Act Program remains in place and contracts remain in effect.

The Williamson Act empowers local governments to establish "agricultural preserves" consisting of lands devoted to agricultural uses and other compatible uses. Upon establishment of such preserves, the locality may offer to owners of included agricultural land the opportunity to enter into annually renewable contracts that restrict the land to agricultural use for at least 10 years (i.e., the contract continues to run for 10 years following the first date upon which the contract is not renewed). In return, the landowner is guaranteed a relatively stable tax rate, based on the value of the land for agricultural/open space use only and unaffected by its development potential.

Local

State law requires each county and city to prepare and adopt a general plan for its physical development (Government Code Section 65300). This general plan must address the seven topics (referred to as “elements”) of land use, circulation, housing, open space, conservation, safety, and noise as identified in state law (Government Code Section 65302), to the extent that the topics are locally relevant. [Note: The land use, housing, and open space elements statutorily include agriculture, and forests/timber lands are statutorily included in the land use, conservation, and open space elements.] In addition, the cities and counties within the jurisdiction of the San Joaquin Valley Air Pollution Control District must address air quality in their general plans.

The general plan may address other topics that the community deems relevant to its development, such as economic development, historic preservation, and urban design. The format and structure of the general plan is also left to local discretion, but regardless of the format or issues addressed, all substantive parts of the plan must be consistent with one another (i.e., internally consistent). For instance, the policies in the land use element must be consistent with those of the housing element, and vice versa. In addition to the mandatory elements described above, counties have included additional topics in their general plans, including agriculture. Under state law, once included in the General Plan, these elements carry the same weight of law as those that are legally mandated.

Through their general plans, local jurisdictions have adopted policies to protect as well as mitigate for impacts to these lands.

7.5.2.2 Potential Impacts

In determining whether impacts to agricultural resources are significant environmental impacts, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state’s inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

Would the project:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping & Monitoring Program of the California Resources Agency, to non-agricultural uses?

The project would have a **less than significant impact.**

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

The project would have a **less than significant impact.**

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

The project would have a **less than significant impact.**

d) Result in the loss of forest land or conversion of forest land to non-forest use?

The project would have a **potentially significant impact**.

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

The project would have a **potentially significant impact**.

7.5.2.3 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Monitoring is not expected to directly or indirectly affect agricultural and forest resources. Any potential increase in the frequency of monitoring will have no effect on agricultural and/or forest resources (items a-e). No mitigation is required.

Potential Impacts from Structural Control Construction

The construction of toxicity controls would not alter zoning laws or require conversions to different land uses (items a, b, c).

Impacts to agricultural and/or forest resources were found to be less than significant or to have no impact in the environmental analyses reviewed by State Water Board staff. The City of Merced, however, determined that their project would result in the conversion of 20 acres of Prime Farmland and Farmland of Statewide Importance to non-agricultural uses. They found this impact to be significant and unavoidable even with mitigation. However, the impacts were due to the expansion of the capacity of the WWTP, not the treatment upgrades.

The construction of structural controls for non-storm water NPDES dischargers is expected to occur within existing facilities or in previously disturbed areas. The likelihood of agricultural or forestry lands being affected is very low. However, it is possible that construction could occur outside of the existing footprint of the facility, and on farm or forest lands. For example, a settling pond could be constructed on land currently used for farming. Measures could be taken to avoid or reduce this loss. The potential for impacts to agricultural or forestry lands could be potentially significant (items d and e).

The Provisions are not anticipated to require structural control construction measures for storm water dischargers, for nonpoint source dischargers, or for other non-NPDES dischargers. Many of the controls identified in Sections 6.5.3 and 6.5.4 of this Staff Report are non-structural controls, such as nutrient and pesticide management plans, which are anticipated to have less than significant impacts. Some structural controls, such as diverting runoff away from surface waters and maintaining adequate riparian buffer strips are structural controls that could possibly have impacts on farmland (item e). However, there could be a potentially significant impact on agricultural and forest resources.

Potential Impacts from Operation and Maintenance Activities

Operation and maintenance activities (O/M) from the installation of toxicity controls at non-storm water NPDES discharge facilities would take place within the footprint of the facilities and is not anticipated to impact surrounding agricultural and/or forest resources. The structural controls identified for non-point sources, which may take place on or near agricultural or forest lands, such as maintaining riparian corridors and installing berms to divert runoff away from surface waters take little or no O/M and would not impact agricultural and/or forest resources (items a- e).

Summary

Compliance with the Provisions is anticipated to have a potentially significant impact on agricultural or forestry resources.

7.5.3 Air Quality

Daily emissions and pollutant concentrations are two ways to quantify air pollution. The term “emissions” means the quantity of pollutant released into the air and has unit of pounds per day (lbs/day). The term “concentrations” means the amount of pollutant material per volumetric unit of air and has unit of parts per million (ppm) or micrograms per cubic meter (µg/m3).

Criteria Pollutants

The Air Resources Board has established state ambient air quality standards (state standards) to identify outdoor pollutant levels considered safe for the public. After state standards are established, state law requires Air Resources Board to designate each area as attainment, nonattainment, or unclassified for each state standard. The area designations, which are based on the most recent available data, indicate the healthfulness of air quality throughout the state.

In addition to state standards, the federal Clean Air Act requires U.S. EPA to set national ambient air quality standards (federal standards or national standards). The Air Resources Board makes area designations for ten pollutants: ozone, suspended particulate matter (PM10 and PM2.5), carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and visibility reducing particles. Ambient air quality standards define clean air and are established to protect even the most sensitive individuals in our communities. An air quality standard defines the maximum amount of a pollutant that can be present in outdoor air without harm to the public's health.

The gaseous criteria pollutants, particulate matter, and toxic air contaminants, and the associated adverse health effects of these air quality contaminants are summarized below.

Carbon Monoxide

Exposure to high concentrations of carbon monoxide, a colorless and odorless gas, reduces the oxygen-carrying capacity of the blood, and therefore can cause dizziness and fatigue, impair central nervous system functions, and induce angina in persons with serious heart disease.

Carbon monoxide is emitted almost exclusively from the incomplete combustion of fossil fuels. In urban areas, motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains emit carbon monoxide. Motor vehicle exhaust releases most of the carbon monoxide in urban areas. Vehicle exhaust contributes approximately 56 percent of all carbon monoxide emissions nationwide and up to 95 percent in cities. Carbon monoxide is a non-reactive air pollutant that dissipates relatively quickly. As a result, ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic. Carbon monoxide concentrations are influenced by local meteorological conditions; primarily wind speed, topography, and atmospheric stability. Carbon monoxide from motor vehicle exhaust can become locally concentrated when surface-based temperature inversions combine with calm atmospheric conditions.

Ozone

While ozone serves a beneficial purpose in the upper atmosphere (stratosphere) by reducing potentially harmful ultraviolet radiation, when it reaches elevated concentrations in the lower atmosphere it can be harmful to the human and to sensitive species of plants. Short-term ozone exposure can reduce lung function and increase an individual's susceptibility to respiratory infection. Long-term exposure can impair lung defense mechanisms and lead to emphysema and/or chronic bronchitis. Ozone concentrations build to peak levels during periods of light winds or stagnant air, bright sunshine, and high temperatures. Ideal conditions occur during summer and early autumn. Sensitivity to ozone varies among individuals. About 20 percent of the population is sensitive to ozone, with exercising children being particularly vulnerable. Ozone is formed in the atmosphere by a complex series of chemical reactions under sunlight that involve “ozone precursors.” Ozone precursors are categorized into two families of pollutants: oxides of nitrogen and reactive organic compounds. Oxides of nitrogen and reactive organic compounds are emitted from a variety of stationary and mobile sources. While oxides of nitrogen are considered a criteria pollutant, reactive organic compounds are not in this category, but are included in this discussion as ozone precursors. Ozone is the chief component of urban smog and the damaging effects of photochemical smog generally relate to the concentration of ozone. Meteorology and terrain play major roles in ozone formation. The greatest source of smog producing gases is the automobile.

Nitrogen Dioxide

The major health effect from exposure to high levels of nitrogen dioxide is the risk of acute and chronic respiratory disease. Like ozone, nitrogen dioxide typically is not directly emitted, but it is formed through a rapid reaction between nitric oxide and atmospheric oxygen. Nitric oxide and nitrogen dioxide are collectively called oxides of nitrogen and are major contributors to ozone formation. Nitrogen dioxide also contributes to the formation of respirable particulate matter (see discussion of respirable particulate matter below) and fine particulate matter through the formation of nitrate compounds. At atmospheric concentrations, nitrogen dioxide is only potentially irritating. In high concentrations, the result is a brownish-red cast to the atmosphere and reduced visibility.

Sulfur Dioxide

The major health effect from exposure to sulfur dioxide is acute and chronic respiratory disease. Exposure may cause narrowing of the airways, which may cause wheezing, chest tightness, and shortness of breath. Sulfur dioxide can also react with water in the atmosphere to form acids (or “acid rain”), which can cause damage to vegetation and man-made materials. The main source of sulfur dioxide is coal and fuel oil combustion in power plants and industries, as well as diesel fuel combustion in motor vehicles. Generally, the highest levels of sulfur dioxide are found near large industrial complexes. In recent years, sulfur dioxide concentrations have been reduced by the increasingly stringent controls placed on stationary source emissions of sulfur dioxide and by limiting the sulfur content in fuel. Sulfur dioxide concentrations in southern California have been reduced to levels well below the state and national ambient air quality standards, but further reductions in emissions are needed to attain compliance with ambient air quality standards for sulfates, respirable particulate matter, and fine particulate matter, to which sulfur dioxide is a contributor.

Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere.

Particulate matter is regulated as respirable particulate matter (inhalable particulate matter less than ten micrometers in diameter). More recently it has been subdivided into coarse and fine fractions, with particulate matter less than 2.5 micrometers in diameter constituting the fine fraction. Major sources of respirable particulate matter include crushing or grinding operations; dust stirred up by vehicles traveling on roads; wood-burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. Fine particulate matter results from fuel combustion (e.g., from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, fine particulate matter can be formed in the atmosphere from gases such as sulfur dioxide, oxides of nitrogen, reactive organic compounds, and ammonia, and elemental carbon. Fine particulate matter is a subset of respirable particulate matter.

The health effects from long-term exposure to high concentrations of particulate matter are increased risk of chronic respiratory disease like asthma and altered lung function in children. Particles with 2.5 to 10 microns in diameter tend to collect in the upper portion of the respiratory system. Particles that are 2.5 microns or less are so tiny that they can penetrate deeper into the lungs and damage lung tissues. These substances can be absorbed into the bloodstream and cause damage elsewhere in the body. Short-term exposure to high levels of particulate matter has been shown to increase the number of people seeking medical treatment for respiratory distress, and to increase mortality among those with severe respiratory problems. Particulate matter also results in reduced visibility. Ambient particulate matter has many sources. It is emitted directly by combustion sources like motor vehicles, industrial facilities, and residential wood burning, and in the form of dust from ground-disturbing activities such as construction and farming. It also forms in the atmosphere from the chemical reaction of precursor gases.

Toxic Air Contaminants

Toxic air contaminants include air pollutants that can produce adverse public health effects, including carcinogenic effects, after long-term (chronic) or short-term (acute) exposure. One source of toxic air contaminants is combustion of fossil fuels or digester gas. Human exposure occurs primarily through inhalation, although non-inhalation exposure can also occur when toxic air contaminants in particulate form deposit onto soil and drinking water sources and enter the food chain or are directly ingested by humans. Many pollutants are identified as toxic air contaminants because of their potential to increase the risk of developing cancer. For toxic air contaminants that are known or suspected carcinogens, it has been found that there are no levels or thresholds below which exposure is risk free. No ambient air quality standards exist for toxic air contaminants, except that standards for lead, hydrogen sulfide, and vinyl chloride are provided in California Ambient Air Quality Standards. Instead, numerous national, state, and local rules that affect both stationary and mobile emission sources regulate toxic air contaminants emissions. Individual toxic air contaminants vary greatly in the risk they present; at a given level of exposure one toxic air contaminants may pose a hazard that is many times greater than another. Where data are sufficient to do so, a “unit risk factor” can be developed for cancer risk. The unit risk factor expresses assumed risk to a hypothetical population, the estimated number of individuals in a million who may develop cancer as the result of continuous, lifetime (70-year) exposure to 1 µg/m3 of the toxic air contaminants. Unit risk factors provide a standard that can be used to establish regulatory thresholds for permitting purposes. This is, however, not a measure of actual health risk because actual populations do not experience the extent and duration of exposure that the hypothetical population is assumed to experience. For non-cancer health effects, a similar factor called a Hazard Index is used.

Areas with monitored pollutant concentrations that are lower than ambient air quality standards are designated as “attainment areas” on a pollutant-by-pollutant basis. When monitored concentrations exceed ambient standards, areas are designated as “nonattainment areas.” An area that recently exceeded ambient standards, but is now in attainment, is designated as a “maintenance area.” Nonattainment areas are further classified based on the severity and persistence of the air quality problem as “moderate” “severe” or “serious.” Classifications determine the applicability and minimum stringency of pollution control requirements.

7.5.3.1 Regulatory Setting

Federal

The U.S. EPA is the federal agency charged with administering the federal Clean Air Act Amendments of 1990, which established a number of requirements. The U.S. EPA oversees state and local implementation of federal Clean Air Act requirements. The Clean Air Act Amendments require the U.S. EPA to approve State Implementation Plans to meet and/or maintain the national ambient standards. The federal air quality standards are shown in Table 7-1.

State

The California Air Resources Board is the state agency responsible for coordinating both state and federal air pollution control programs in California. In 1988, the State Legislature adopted the California Clean Air Act, which established a statewide air pollution control program. The California Clean Air Act’s requirements include annual emission reductions, increased development and use of low emission vehicles, and submittal of air quality attainment plans by air districts. The California Air Resources Board established state ambient air quality standards for the same pollutants required under the Clean Air Act, as shown in Table 7-2. Additionally, the California Air Resources Board established state standards for pollutants that have no federal ambient air quality standard, including sulfate, visibility, hydrogen sulfide, and vinyl chloride.

Table 7-1. Federal Ambient Air Quality Standards

Pollutant	Averaging Time	Primary	Secondary
Ozone	8 Hour	0.070 ppm (140 μg/m^3)	0.070 ppm (140 μg/m^3)
Respirable Particulate Matter	24 Hour	150 μg/m^3	150 μg/m^3
Fine Particulate Matter	24 Hour	35 μg/m^3	35 μg/m^3
Fine Particulate Matter	1 Year	12.0 μg/m^3	15.0 μg/m^3
Carbon Monoxide	1 Hour	35 ppm (40 mg/m^3)	None
Carbon Monoxide	8 Hour	9 ppm (10 mg/m^3)	None
Nitrogen Dioxide	1 Hour	0.10 ppm (190 μg/m^3)	None
Nitrogen Dioxide	1 Year	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/m^3)
Sulfur Dioxide	1 Hour	75 ppb (195 μg/m^3)	None
Sulfur Dioxide	3 Hour	None	0.5 ppm (1300 μg/m^3)
Lead	Calendar Quarter	0.15 μg/m^3	0.15 μg/m^3

Table 7-2. California Ambient Air Quality Standards

Pollutant	Averaging Time	Standard
Ozone	1 Hour	0.09 ppm (180 µg/m^3)
Ozone	8 Hour	0.070 ppm (137 µg/m^3)
Respirable Particulate Matter	24 Hour	50 µg/m^3
Respirable Particulate Matter	1 Year	20 µg/m^3
Fine Particulate Matter	24 Hour	None
Fine Particulate Matter	1 Year	12 µg/m^3
Carbon Monoxide	1 Hour	20 ppm (23 mg/m^3)
Carbon Monoxide	8 Hour	9.0 ppm (10 mg/m^3)
Carbon Monoxide	8 Hour (for Lake Tahoe)	6 ppm (7 mg/m^3)
Nitrogen Dioxide	1 Hour	0.18 ppm (339 µg/m^3)
Nitrogen Dioxide	1 Year	0.030 ppm (57 µg/m^3)
Sulfur Dioxide	1 Hour	0.25 ppm (655 µg/m^3)

Pollutant	Averaging Time	Standard
Sulfur Dioxide	24 Hour	0.04 ppm (105 µg/m^3)
Lead	30 Day Average	1.5 µg/m^3

Local

There are 35 local air districts within the state. Each district (referred to as either an Air Pollution Control District or an Air Quality Management District) is responsible for controlling emissions, primarily from stationary sources of air pollution, within their area. Each district develops and adopts an Air Quality Management Plan, which serves as the blueprint to bring their respective areas into compliance with federal and state clean air standards. Rules are adopted to reduce emissions from various sources.

7.5.3.2 Potential Impacts

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:

a) Conflict with or obstruct implementation of the applicable air quality plan?

   The project would have a **potentially significant impact**.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

   The project would have a **potentially significant impact**.

c) Expose sensitive receptors to substantial pollutant concentrations?

   The project would have a **potentially significant impact**.

d) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?

   The project would have a **potentially significant impact**.

e) Create objectionable odors affecting a substantial number of people?

   The project would have a **potentially significant impact**.

f) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

The project would have a **potentially significant impact**.

7.5.3.3 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Monitoring would not obstruct the implementation of air quality plans (item a). No mitigation is required.

Monitoring involves the possible use of vehicles to and from the sample location, and to the laboratory. Implementation of the Provisions is expected to produce a minor rise in vehicle usage which, in turn, harbors the potential to increase emissions, noise levels, and traffic congestion. Numerous variables prohibit an accurate estimate of statewide vehicular use from monitoring including distance between facilities and laboratories, onsite laboratories, courier route, vehicle type, and monitoring frequency.

While some of these variables also hamper an assessment of the vehicular impacts of the sample facilities, State Board staff conducted an analysis of the change in the number of sampling trips and miles traveled for toxicity testing under the Provisions compared to current requirements, regardless of the sampling frequency for other constituents (Table 7-3). These facilities were drawn from the sample used in the economic report that was prepared by Abt Associates in 2018 (for further discussion, see section 9.1.4). This representative sample was used because the wide variety of toxicity requirements currently in effect throughout the state, coupled with the discretionary authority granted in the Provisions render a statewide environmental assessment of the Provisions infeasible and speculative.

This sample set includes the largest non-storm water NPDES dischargers in northern and southern California: the Sacramento Regional Wastewater Treatment Plant, Los Angeles County Sanitation District's (LACSD), and the San Jose Creek Water Reclamation Plant. The remaining facilities provide a representative sample of permitted POTWs discharges: the City of Davis Wastewater Treatment Plant, the Lompoc Regional Wastewater Reclamation Plant, the Victor Valley Regional POTW, and the Colton/San Bernardino Regional Tertiary Treatment Facility. For industrial dischargers, a stratified random sample of five industrial categories was used: chemical products (Dow Chemical Corporation, Pittsburg Plant), metals manufacturers and finishers (USS POSCO Industries), petroleum refineries (Shell Oil, Martinez Refinery and Chevron, Richmond Refinery), pulp and paper mills (Pactiv Corporation, Molded Pulp Mill), and "other industries" (Royal Mountain King Mine, Sacramento Facility and Department of Water Resources [DWR], Warne Power Plant).

The mileage estimates provided in Table 7-3 were calculated using Google Maps and were limited to the sample facilities that are expected to see an increase in routine monitoring frequency. These estimates only account for the number of one-way trips above current testing regimes and assume that the courier uses the shortest distance possible without making other stops.

Of the 13 dischargers examined, eight would likely see an increase in the number of sampling trips. Three would likely see no increase and two are likely to see a decrease in the number of sampling trips per year. This analysis showed an annual increase of 13,341 miles for the representative sample of dischargers.

Caltrans' Traffic Data Branch produces a Monthly Vehicle Miles of Travel (MVMT) report. This report estimates the number of vehicle miles that motorists traveled on California State Highways using a sampling of up to 20 traffic monitoring sites. Various roadway types are used to calculate VMT. The Historical Monthly VMT (Caltrans 2018a) reported a total of 190.21 billion and 195.19 billion miles traveled for the years 2015 and 2016, respectively. In 2017, miles traveled on State Highways totaled 200.03 billion miles (Caltrans 2018b). There has been an increase in travel on State Highways of nearly 5 billion miles for each of the last two years.

A requirement that all non-storm water NPDES dischargers conduct a minimum of biannual chronic toxicity monitoring is included in the Provisions. It is expected that the potential change in the number of trips and potential driving distance will not be increased to a significant level. Dischargers required to comply with effluent limitations will have to conduct monitoring at the frequency specified in the Provisions (biannual, quarterly, monthly). Dischargers not required to comply with effluent limitations will have to conduct at least two tests per year. While the sample dischargers in Table 7-3 were assumed to have effluent limitations for purposes of this CEQA analysis, dischargers without effluent limitations would have a minimum monitoring frequency of at least two per year, but possibly more. Therefore, dischargers will likely have a vehicle mileage either less than or similar to the sample Dischargers in Table 7-3. The increase in miles traveled for the representative sample is 0.0003 percent of the annual statewide increase of VMT. Therefore, any increase in sampling trips will have a less than significant impact on air quality. No mitigation is required.

Table 7-3. Change in Vehicle Mileage for Sample Dischargers

Discharger	Laboratory	Distance Apart (Miles)	Potential Change in Number of Trips	Maximum Potential Distance Change (Miles, Annually)
Royal Mountain King Mine 4461 Rock Creek Road, Copperopolis, CA 95228	Aquatic Bio Systems, Inc. 1300 Blue Spruce Dr. Fort Collins, CO 80524	100*	11	3,300*
City of Davis WWTP 45400 County Rd 28H Davis, CA 95616	Pacific EcoRisk 2250 Cordelia Rd Fairfield, CA 94534	36	8	864
Lompoc Regional WWTP 1801 W Central Ave Lompoc, CA 93436	Aquatic Bioassay Consulting 29 North Olive St Ventura, CA 93001	89	8	2,136
USS-POSCO Industries 900 Loveridge Rd. Pittsburg, CA 94565	Aqua Science 17 Arboretum Dr., Davis, CA 95616	59	8	472
Victor Valley Regional WWTP 20111 Shay Rd. Victorville, CA 92394	Aquatic Bioassay Consulting 29 North Olive St Ventura, CA 93001	137	11	4,521
Pactiv LLC Molded Pulp Mill 1000 Diamond Avenue Red Bluff, CA 96080	Sierra Foothill Laboratory (2013-2014) 255 Scottsville Dr., Jackson, CA 95642	181	4	1,955 **

Discharger	Laboratory	Distance Apart (Miles)	Potential Change in Number of Trips	Maximum Potential Distance Change (Miles, Annually)
LACSD San Jose Creek 1965 Workman Mill Road Whittier, CA 90601	Pacific EcoRisk 2250 Cordelia Rd., Fairfield, CA 94534	443	0	0
Chevron Richmond Refinery 525 Castro Street, Richmond, CA 94801	Pacific EcoRisk 2250 Cordelia Rd., Fairfield, CA 94534	31	0	0
Colton/San Bernardino RIX 399 Chandler Place San Bernardino, CA 92408	Babcock Laboratories 6100 Quail Valley Court, Riverside, CA 92507	20	0	0
Forestville WDR Wastewater Treatment, Recycling, and Disposal Facility 6194 Forestville Street Forestville, CA 95436	Pacific EcoRisk 2250 Cordelia Rd Fairfield, CA 94534	67	1	201
Sacramento Regional CSD WWTP 8521 Laguna Station Road Elk Grove, CA 95758	Pacific EcoRisk (for *C. dubia*) 2250 Cordelia Rd., Fairfield, CA 94534 Onsite (for other species	57	0	0

Discharger	Laboratory	Distance Apart (Miles)	Potential Change in Number of Trips	Maximum Potential Distance Change (Miles, Annually)
California DWR Warne Power Plant Hwy. 99 at Pyramid Lake Castaic, CA 91310	Aquatic Bioassay Consulting 29 North Olive St Ventura, CA 93001	65	3	585
Shell Oil Products US Martinez Facility 3485 Pacheco Blvd., Martinez, CA 94553	Pacific EcoRisk 2250 Cordelia Rd., Fairfield, CA 94534	22	8	528

*The laboratory used by this discharger is over 1,000 miles away. It was assumed that samples are sent from the discharger to the laboratory through an overnight air delivery service. In-state vehicle miles traveled were therefore estimated to be driving distance between the facility and a nearby airport (Sacramento International Airport).

** Pactiv LLC's NPDES existing requires only two samples over a five-year permit term. Miles traveled for two trips over the five years was averaged to determine an annual baseline value.

It is expected that emissions will vary among the vehicles used by the assorted courier services, with certain companies using vehicles with high fuel economies and low emissions. For example, the United Parcel Service, the world's largest package delivery company, currently uses 9,100 low- emissions vehicles (United Parcel Service, 2018), and their competitor, FedEx, is currently testing trucks that run on liquefied and compressed natural gas (Baker, 2017). In addition, the staggering of sample collection times—with the Water Boards determining when calendar months begin and end—and the potential to combine sample collection trips for toxicity and individual constituents is expected to further reduce additional vehicle miles traveled and therefore emissions, as well as impacts to traffic and noise. Furthermore, several dischargers currently use onsite laboratories to determine compliance with toxicity limitations, and it is expected that they would continue to do so to meet the requirements under the Provisions. Lastly, some dischargers that do not possess reasonable potential would not be required to conduct routine monitoring under the Provisions, while other dischargers may be granted an exemption from some or all of the monitoring requirements of the Provisions, thereby possibly reducing, or entirely eliminating vehicular impacts related to toxicity monitoring altogether.

Therefore, the Provisions are not expected to contribute substantially to any existing or projected air quality violation (item b), expose sensitive receptors to substantial pollutant concentrations (item c), or result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment (item d), or create objectionable odors affecting a substantial number of people (item e), or result in other emissions adversely affecting a substantial number of people (item f). No mitigation is required.

Potential Impacts from Structural Control Construction

Of the project-specific environmental documents reviewed, the potential impacts to air quality ranged from no impact to less than significant with mitigation. The identified potential impacts were associated with construction activities, while operational activities had less than significant impacts.

Construction-related emissions would be short-term, but could still cause adverse effects on air quality (item a and b). It could also expose sensitive receptors to substantial pollutant concentrations (item c) or create objectionable odors affecting a substantial number of people (item e). It could also increase a criteria pollutant for which a project region is in non-attainment under an applicable federal or state ambient air quality standard (item d). Project construction activities would include site preparation, earthmoving, and general construction. Site preparation includes activities such as general land clearing and grubbing. Earthmoving activities include cut-and-fill operations, trenching, soil compaction, and grading. General construction includes adding improvements such as surfaces, structures, and facilities. The emissions generated from these construction activities include:

- Dust (including PM10 and PM2.5) primarily from "fugitive" sources (i.e., emissions released through means other than through a stack or tailpipe) such as soil

disturbance;
- Combustion emissions of criteria air pollutants (ROG, NOx, carbon monoxide, carbon dioxide, PM10, and PM2.5) primarily from operation of heavy off-road construction equipment (primarily diesel-operated), portable auxiliary equipment, and construction worker automobile trips (primarily gasoline-operated); and
- Evaporative emissions (ROG) from asphalt paving and architectural coatings.

Construction is expected to be localized and temporary. However, there could be increases in emissions. Impacts associated with those increases (items a- e) could be eliminated or reduced through mitigation measures.

Mitigation measures to minimize emissions include, but are not limited to:

- Maintain all construction equipment in proper tune according to manufacturer's specifications;
- Fuel all off-road and portable diesel powered equipment with the California Air Resources Board (ARB) certified motor vehicle diesel fuel (non-taxed version suitable for use off-road);
- Use diesel construction equipment meeting ARB's Tier 2 certified engines or cleaner off- road heavy-duty diesel engines, and comply with the State Off-Road Regulation;
- Use on-road heavy-duty trucks that meet the ARB's 2007 or cleaner certification standard for on-road heavy-duty diesel engines, and comply with the State On-Road Regulation;
- Construction or trucking companies with fleets that that do not have engines in their fleet that meet the engine standards identified in the above two measures (e.g. captive or NOx exempt area fleets) may be eligible by proving alternative compliance;
- All on-and off-road diesel equipment shall not idle for more than five minutes. Signs shall be posted in the designated queuing areas and or job sites to remind drivers and operators of the 5 minute idling limit;
- Electrify equipment when feasible;
- Substitute gasoline-powered in place of diesel-powered equipment, where feasible;
- Use alternatively fueled construction equipment on-site where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane or biodiesel.
- Reduce the amount of the disturbed area where possible.
- Use of water trucks or sprinkler systems in sufficient quantities to prevent airborne dust from leaving the site. Increased watering frequency would be required whenever possible.

- All dirt stock pile areas should be sprayed daily as needed.
- Permanent dust control measures identified in the approved project revegetation and landscape plans should be implemented as soon as possible following completion of any soil disturbing activities.
- Exposed ground areas that are planned to be reworked at dates greater than one month after initial grading should be sown with fast germinating native grass seed and watered until vegetation is established.
- All disturbed soil areas not subject to revegetation should be stabilized using approved chemical soil binders, jute netting, or other methods approved in advance.
- All roadways, driveways, sidewalks, etc. to be paved should be completed after grading unless seeding or soil binders are used.
- Vehicle speed for all construction vehicles shall not exceed 15 mph on any unpaved surface at the construction site.
- All trucks hauling dirt, sand, soil, or other loose materials are to be covered or should maintain at least two feet of freeboard.
- Install wheel washers where vehicles enter and exit unpaved roads onto streets, or wash off trucks and equipment leaving the site.
- Sweep streets at the end of each day if visible soil material is carried onto adjacent paved roads. Water sweepers with reclaimed water should be used where feasible.

Potential Impacts from Operation and Maintenance Activities

Of the structural controls identified in Chapter 6, several may result in air emissions (typically through energy use), including reverse osmosis and running wastewater through filters. The facility upgrade projects reviewed found that potential impacts to air quality from operation and maintenance (O/M) activities would be less than significant. In some cases, O/M activities after construction were similar to O/M activities before construction and there was no change in emissions (City of Lake Shasta). In other cases, there was a reduction in emissions (EchoWater Project). All of the reasonably foreseeable methods of compliance are not of the size or scale to result in alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally.

The State Water Board expects that any future changes to O/M activities as a result of facility upgrades will also have a less than significant impact on air quality (items a-f).

Summary

The construction of structural controls could result in potentially significant environmental effects with regard to air quality. However, measures can be applied to reduce and/or eliminate these impacts, as described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts.

Therefore, these impacts could be significant.

7.5.4 Biological Resources

A general description of the environmental setting is presented in Appendix C of this document.

7.5.4.1 Regulatory Background

Federal

Federal Endangered Species Act

Pursuant to the federal Endangered Species Act, the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries Service, formerly National Marine Fisheries Service, have regulatory authority over federally listed species. Under the Endangered Species Act, a permit is required for any federal action that may result in "take" of a listed species. Section 9 of the Endangered Species Act defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Under federal regulations, take is further defined to include the modification or degradation of habitat where such activity results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

State

California Endangered Species Act

Pursuant to the California Endangered Species Act, a permit from the California Department of Fish and Wildlife is required for projects that could result in take of a plant or animal species that is state listed as threatened or endangered. Under California Endangered Species Act, "take" is defined as an activity that would directly or indirectly kill an individual of a species.

Authorization for take of state-listed species can be obtained through a California Fish and Wildlife Code section 2080.1 consistency determination or a section 2081 incidental take permit.

Section 1600 of the California Fish and Wildlife Code

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake in California that supports wildlife resources is subject to regulation by the California Department of Fish and Wildlife, under sections 1600–1603 of the California Fish and Wildlife Code. Section 1601 states that it is unlawful for any agency to substantially divert or obstruct the natural flow or substantially change the bed, channel or bank of any river, stream or lake designated by California Department of Fish and Wildlife, or use any material from the streambeds, without first notifying California Department of Fish and Wildlife of such activity.

The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. California Department of Fish and Wildlife's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. Accordingly, a California Department of Fish and Wildlife Streambed Alteration Agreement must be obtained for any project that would result in diversions of surface flow or other alterations to the bed or bank of a river, stream, or lake.

Local

Numerous California cities and counties have adopted ordinances, regulations and policies for the protection and enhancement of natural resources, including heritage trees, important natural features, habitat alteration, and common and special status species.

7.5.4.2 Potential Impacts

Would the project:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS?

   The project would have a **potentially significant impact**.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFW or USFWS?

   The project would have a **potentially significant impact**.

c) Have a substantial adverse effect on state or federally-protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption or other means?

   The project would have a **potentially significant impact**.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The project would have a **less than significant impact**.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The project would have a **less than significant impact**.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The project would have a **less than significant impact**.

7.5.4.3 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Potential increases in the frequency of monitoring will have no impact on biological resources (items a-f) because taking an effluent sample and conducting a toxicity test in a laboratory does not modify the habitat, wetlands, or the movement of fish or wildlife. If a Regional Water Board exempts a facility under the insignificant discharge exemption, the Regional Water Board may require monitoring less frequently. If insignificant dischargers are exempted from routine monitoring and one or more of these dischargers release toxics into the environment, this could adversely affect biological resources by direct mortality or by causing interference with growth and/or reproduction. However, since Regional Water Boards must make a finding that a qualifying discharge has no reasonable potential to cause, or contribute to, an exceedance of the toxicity objectives, such impacts are anticipated to be less than significant. No mitigation is required.

Potential Impacts from Structural Control Construction

No impact to policy or plans concerning biological resources are anticipated (item e and item f). Some methods of compliance involve earthmoving or construction and therefore can impact habitat, as described below (items a, b, and c). Any project that alters habitat could have a small impact on the movement of wildlife.

In general, the sites for the facility upgrades are likely located in previously developed areas and the presence of fish and wildlife species and their supporting habitat severely limited. Any watercourses, riparian habitat or wetlands downstream from the construction and maintenance activities are unlikely to be adversely impacted further by these compliance measures. Rather, in the long term, these areas would be improved by the reduction in toxicity entering from upstream sources. Still, a site for a facility upgrade could be in the habitat of sensitive species, riparian habitat, or federally protected wetlands. Such construction projects must also include an environmental analysis and consider mitigation and alternatives for any potentially significant impacts.

Of the project-specific environmental documents reviewed, potential impacts to biological resources ranged from less than significant to less than significant with mitigation. Most of the projects reviewed did not identify any direct impacts on fish and wildlife habitats or special status species due to facility upgrades. These projects still identified mitigation measures to be implemented on the off chance that special status species were encountered during construction.

The EchoWater project did identify direct impacts to aquatic habitat and special status species (Sacramento Regional County Sanitation District, 2014). The City of Merced also identified direct impacts to special status species (City of Merced, 2006). Both projects identified mitigation measures to reduce those impacts to less than significant levels. In general, mitigation measures include avoidance (both temporal and special), relocation, replacement, and/or compensatory. Specific measures are tailored to the species or habitat of concern.

For construction or earth moving related activities, measures could be implemented to reduce or avoid potential project-level impacts to biological resources. Assuming any unique species are present, plant number and species diversity could be maintained by either preserving them prior, during, and after the construction or by reestablishing and maintaining the plant communities post construction. When the specific projects are developed and sites identified, a search of the California Natural Diversity Database could be employed to confirm that any potentially sensitive plant species or biological habitats in the site area are properly identified and protected as necessary. Focused protocol plant surveys for special-status-plant species could be conducted at each site location, if appropriate. If sensitive plant species occur on the project site, mitigation would be required consistent with appropriate expert analysis.

Mitigation measures should be developed in coordination with U.S. Fish and Wildlife Services and the California Department of Fish and Wildlife. Responsible agencies should endeavor to avoid compliance measures that could result in reduction of the numbers of any unique, rare or endangered species of plants, and instead opt for siting physical compliance measures sufficiently upstream or downstream of sensitive areas to avoid any impacts.

In the case that landscaping is incorporated into the specific project design, the possibility of disruption of resident native species could be avoided or minimized by using only plants native to the area. Use of exotic invasive species or other plants listed in the Exotic Pest

Plants of Greatest Ecological Concern in California should be prohibited (California Invasive Plant Council 2000). Responsible agencies should endeavor to avoid requiring compliance measures that could result in significant impacts to unique, rare or endangered (special-status) species, should any such species be present at locations where activities associated with such compliance measures might not otherwise be performed. Mitigation measures, however, could be implemented to ensure that potentially significant impacts to special status animal species are less than significant. When the specific projects are developed and sites identified, a search of the California Natural Diversity Database could be employed to confirm that any potentially special-status animal species in the site area are properly identified and protected as necessary. Focused protocol animal surveys for special-status animal species should be conducted at each site location.

If special-status animal species are potentially near the project site area two weeks prior to grading or the construction of facilities and per applicable U.S. Fish and Wildlife Services or California Department of Fish and Wildlife protocols, pre-construction surveys to determine the presence or absence of special-status species could be conducted. The surveys should extend off site to determine the presence or absence of any special-status species adjacent to the project site. If special-status species are found to be present on the project site or within the buffer area, mitigation should be required consistent with appropriate expert analysis. To this extent, mitigation measures could be developed in coordination with the U.S. Fish and Wildlife Services and the California Department of Fish and Wildlife to reduce potential impacts.

If construction activities occur at locations where they would foreseeably adversely impact species migration or movement patters, mitigation measures previously described could be implemented to ensure that impacts which may result in a barrier to the migration or movement of animal are less than significant (item d) Any site-specific wildlife crossings should be evaluated in consultation with the California Department of Fish and Wildlife. If a wildlife crossing would be significantly impacted in an adverse manner, then the design of the project should include a new wildlife crossing in the same general location.

If construction occurs during the avian breeding season for special status species and/or Migratory Bird Treaty Act -covered species, generally February through August, then prior (within two weeks) to the onset of construction activities, surveys for nesting migratory avian species would be conducted on the project site following U.S. Fish and Wildlife Services or California Department of Fish and Wildlife guidelines. If no active avian nests are identified on or within 200 feet of construction areas, no further mitigation would be necessary.

Alternatively, to avoid impacts, construction could begin after the previous breeding season for covered avian species and before the next breeding season begins. If a protected avian species were to establish an active nest after construction was initiated and outside of the typical breeding season (February – August), the project sponsor, would be required to establish a buffer of 200 feet or other measure that would result in equivalent mitigation between the construction activities and the nest site.

If active nests for protected avian species are found within the construction footprint or within the 200-foot buffer zone, construction could be required to be delayed within the construction footprint and buffer zone until the young have fledged or appropriate mitigation measures responding to the specific situation are developed in coordination with U.S. Fish and Wildlife Service or California Department of Fish and Wildlife. These impacts are highly site-specific, and assuming they are foreseeable, they would require a project-level analysis and mitigation plan.

Finally, to the extent feasible, responsible agencies should endeavor to avoid compliance measures that could result in significant barriers to the beneficial migration or movement of animals. A less than significant impact is anticipated after mitigation.

Potential Impacts from Operation and Maintenance Activities

Operation and maintenance activities (O/M) from the installation of toxicity controls at non-storm water NPDES discharge facilities would take place within the footprint of the facilities and is not anticipated to impact surrounding biological resources (items a-f). The structural controls identified for non-point sources, which may take place on or near habitat or riparian corridors, such as installing berms to divert runoff away from surface waters, take little or no O/M and would not impact biological resources (items a-f).

Summary

The construction of structural controls could result in potentially significant environmental effects with regard to biological resources. Measures, however, can be applied to reduce and/or eliminate these impacts, as described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.5 Cultural Resources

Cultural resources generally include buildings, sites, districts, structures, and objects significant in history, architecture, archaeology, culture, or science. Historic resources are generally defined as properties that are listed or have been determined eligible for listing on the National Register of Historic Places (NRHP), the California Register of Historical Resources, or a local register or inventory of resources. The Paleontological Resources Preservation Act defines the term paleontological resource as “any fossilized remains, traces, or imprints of organisms, preserved in or on the earth’s crust, that are of paleontological interest and that provide information about the history of life on earth.”

7.5.5.1 Regulatory Background

Federal

Section 106 of the National Historic Preservation Act

Section 106 of the NHPA, as amended, and its implementing regulations found at 36 CFR Part 800, require federal agencies to identify cultural resources that may be affected by actions involving federal lands, funds, or permitting actions.

The significance of the resources must be evaluated using established criteria outlined at 36 CFR 60.4, as described below. If a resource is determined to be a historic property, Section 106 of the NHPA requires that effects of the undertaking on the resource be determined. A historic property is:

> …any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion in the National Register of Historic Places, including artifacts, records, and material remains related to such a property (NHPA Sec. 301[5]).

Section 106 of the NHPA prescribes specific criteria for determining whether an undertaking would adversely affect an historic property, as defined in 36 CFR 800.5. An impact is significant when the following occurs to prehistoric or historic archaeological sites, structures, or objects that are National Register of Historic Places (NRHP) listed, or eligible for NRHP listing:

- physical destruction or damage to all or part of the property;
- alteration of a property;
- removal of the property from its historic location;
- change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
- introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features; and
- neglect of a property that causes its deterioration; and the transfer, lease, or sale of the property.

If it is determined that a historic property will be adversely affected by implementation of a proposed action, prudent and feasible measures to avoid or reduce adverse impacts must be taken. The State Historic Preservation Officer (SHPO) must be provided an opportunity to review and comment on these measures prior to implementation of the proposed action.

National Register of Historic Places

The eligibility of a resource for listing in the NRHP is determined by evaluating the resource using criteria defined in 36 CFR 60.4 as follows:

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, association, and:

1. That are associated with events that have made a significant contribution to the broad patterns of our history;
2. That are associated with the lives of persons significant in our past;
3. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
4. That has yielded, or may be likely to yield, information important to prehistory or history.

Sites younger than 50 years, unless of exceptional importance, are not eligible for listing in the NRHP. In addition to meeting at least one of the criteria outlined above, the property must also retain enough integrity to enable it to convey its historic significance. The National Register recognizes seven aspects or qualities that, in various combinations, define integrity (NPS, 1990). These seven elements of integrity are location, design, setting, materials, workmanship, feeling, and association. To retain integrity a property will always possess several, and usually most, of these aspects.

While most historic buildings and many historic archaeological properties are significant because of their association with important events, people, or styles (Criteria A, B, and C), the significance of most prehistoric and historic-period archaeological properties is usually assessed under Criterion D. This criterion stresses the importance of the information contained in an archaeological site, rather than its intrinsic value as a surviving example of a type or its historical association with an important person or event. It places importance not on physical appearance, but rather on information potential.

State

California Environmental Quality Act

The State CEQA Guidelines recognize that a historical resource includes: (1) a resource in the California Register; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC section 5024.1(g); and (3) any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

If a lead agency determines that an archaeological site is a historical resource, the provisions of PRC Section 21084.1 and CCR Section 15064.5 apply. If an archaeological site does not meet the criteria for an historical resource contained in the State CEQA

Guidelines, then the site may be treated in accordance with the provisions of PRC Section 21083, as a unique archaeological resource. As defined in Section 21083.2 a "unique" archaeological resource is an archaeological artifact, object, or site, about which it can be clearly demonstrated that without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information;
- has a special and particular quality such as being the oldest of its type or the best available example of its type; or
- is directly associated with a scientifically recognized important prehistoric or historic event or person.

The State CEQA Guidelines note that if an archaeological resource is neither a unique archaeological nor a historical resource, the effects of the project on those resources shall not be considered a significant effect on the environment (CCR Section 15064.5(c)(4)).

California Register of Historical Resources

The California Register is "an authoritative listing and guide to be used by State and local agencies, private groups, and citizens in identifying the existing historical resources of the State and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). The criteria for eligibility for the California Register are based upon National Register of Historic Places criteria (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally determined eligible for, or listed in, the National Register.

To be eligible for the California Register, a prehistoric or historic-period property must be significant at the local, State, and/or federal level under one or more of the following four criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

A resource eligible for the California Register must meet one of the criteria of significance described above and retain enough of its historic character or appearance (integrity) to be recognizable as a historical resource and to convey the reason for its significance.

Additionally, the California Register consists of resources that are listed automatically and those that must be nominated through an application and public hearing process. The California Register automatically includes the following:

- California properties listed on the National Register and those formally determined to be eligible for the National Register,
- California Registered Historical Landmarks from No. 770 onward, and
- those California Points of Historical Interest that have been evaluated by the Office of Historic Preservation and have been recommended to the State Historical Commission for inclusion on the California Register.

Other resources that may be nominated to the California Register include:

- historic resources with a significance rating of Category 3 through 5 (those properties identified as eligible for listing in the National Register, the California Register, and/or a local jurisdiction register);
- individual historic resources;
- historic resources contributing to historic districts; and
- historic resources designated or listed as local landmarks, or designated under any local ordinance, such as an historic preservation overlay zone.

Paleontological Resources: California Public Resources Code

The PRC protects paleontological resources through Section 5097.5 which prohibits “knowing and willful” excavation, removal, destruction, injury, and defacement of any paleontological feature on public lands (lands under state, county, city, district, or public authority jurisdiction, or the jurisdiction of a public corporation), except where the agency with jurisdiction has granted permission.

Local

Numerous California cities and counties have adopted ordinances, regulations and policies for the protection of archaeological and paleontological resources.

7.5.5.2 Potential Impacts

Would the project:

a) Cause a substantial adverse change in the significance of a historical resource as defined in pursuant to §15064.5?

   The project would have a **potentially significant impact**.

b) Cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?

The project would have a **potentially significant impact**.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

The project would have a **potentially significant impact**.

d) Disturb any human remains, including those interred outside of dedicated cemeteries?

The project would have a **potentially significant impact**.

7.5.5.3 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Monitoring is not expected to have an impact on cultural resources (items a-d). No mitigation is required.

Potential Impacts from Structural Control Construction

If a discharger chooses to implement a structural control, the construction related activities would mostly occur in currently developed areas where ground disturbance has previously occurred. Because these areas are already developed it is unlikely that construction activities would cause a substantial adverse change to historical, archeological, or cultural resources, destroy paleontological resources, or disturb human remains. Depending, however, on the location of facilities, potential impacts to cultural resources or tribal cultural resources could occur (items a-d). Paleontological resources can be found in areas containing fossil-bearing formations. Archaeological resources have been found within urbanized areas. Historic, archeological, and cultural resources have also been found within urbanized areas. The site- specific presence or absence of these resources is unknown because the specific locations for compliance methods would be determined by responsible agencies at the project level.

Installation of these systems could result in minor ground disturbances, which could impact cultural resources if they are sited in locations containing these resources and where disturbances have not previously occurred.

None of the facility upgrade projects reviewed identified any direct impacts to cultural resources. However, there is always the potential that previously undiscovered resources will be encountered during earth disturbing activities. Inclusion of the following mitigation measures should reduce potential impacts to less than significant:

- Accidental Discovery - If paleontological or historic or prehistoric archaeological resources (such as chipped or ground stone, large quantities of shell, historic debris, building foundations, or human bone) are inadvertently discovered during ground disturbing activities, no further construction should be permitted within 100 feet of the find until a qualified paleontologist or archaeologist can assess the significance of the find and prepare an avoidance, evaluation, or recovery plan. Such a plan may involve resource avoidance, or could include recovery and archival research.
- Discovery of Human Remains - In the event that human remains are encountered during construction activities, the project proponent should comply with Section 15064.5 (e) (1) of the CEQA Guidelines and PRC Section 7050.5. All project-related ground disturbance in the vicinity of the human remains should be halted until the county coroner has been notified. If the coroner determines that the remains are Native American, the coroner should notify the Native American Heritage Commission (NAHC) to identify the most likely descendants of the deceased Native Americans. Project- related ground disturbance in the vicinity of the find shall not resume until the process detailed in Section 15064.5 (e) has been completed.

Potential Impacts from Operation and Maintenance Activities

Operation and maintenance activities (O/M) from the installation of toxicity controls would not result in an impact to cultural resources (items a-d). O/M may occur inside buildings, or within previously developed areas. In addition, O/M would not be expected to lead to ground disturbing activities, beyond existing conditions. Therefore, no impact is expected.

Summary

The installation of structural controls could result in potentially significant environmental effects with regard to cultural resources. Measures, however, can be applied to reduce and/or eliminate these impacts, as generally described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.6 Energy

7.5.6.1 Regulatory Background

<u>State</u>

California Integrated Energy Policy

Senate Bill (SB) 1389, passed in 2002, requires the California Energy Commission (CEC) to prepare an Integrated Energy Policy Report (IERP) for the governor and legislature every two years. The report analyzes data and provides policy recommendations on trends and issues concerning electricity and natural gas, transportation, energy efficiency, renewable energy, and public interest energy research (CEC 2019a).

The California Energy Efficiency Strategic Plan

As a result of Assembly Bill 32 (AB 32), passed in 2006, the California Air Resources Board set energy efficiency goals in order to reduce emissions of greenhouse gasses. In order to assist, the California Public Utilities Commission developed the California Energy Efficiency Strategic Plan in 2008 to establish energy efficiency targets applicable to its regulated utilities (CPUC 2008).

California Renewables Portfolio Standard

California's Renewables Portfolio Standard (RPS), updated in 2018, sets a goal of obtaining 100 percent zero-carbon electricity for the state by 2045. Interim targets are established to achieve 33 percent electricity produced from renewable sources by 2020 and 50 percent by 2026 (CEC 2019b, CEC 2019c).

7.5.6.2 Potential Impacts

a) Would the project:Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

   The project would have **potentially significant impact**

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

   The project would have a **less than significant impact**.

7.5.6.3 Impacts and Mitigation

The Provisions are very unlikely to obstruct any state or local plans for renewable energy or energy efficiency (item b). However, depending on how toxicity may be addressed, construction of treatment facilities may consume energy and some ongoing treatment options will consume additional energy. Treatment processes can be developed in ways that will use energy efficiently and not result in significant environmental impacts from unnecessary or wasteful consumption of energy (item a).

Potential Impacts from Monitoring

Requiring all non-storm water NPDES dischargers to conduct aquatic toxicity monitoring at least twice per year would have a less than significant impact on energy use. Energy consumption from monitoring would result from collecting and shipping samples and organisms and conducting toxicity tests within the laboratories, through the use of electricity to conduct the test (e.g., keeping samples at the appropriate temperature). However, dischargers can reduce energy consumption from monitoring consolidating sampling and shipment with required monitoring tests for priority pollutants, or by coordinating sample collection and shipments to aquatic toxicity testing laboratories with other non-storm water NPDES dischargers in their area. In addition, an increase in testing is not expected to change the energy consumption of laboratories that are already established to conduct tests with aquatic life species. Any energy use is expected to be efficient and a necessary consumption to conducting the test. Therefore, potential energy impacts from monitoring are anticipated to be less than significant**.**

Potential Impacts from Structural Control Construction Under the proposed project, construction/installation of certain treatment practices (e.g., sediment basins, increased storage capacity, treatment upgrades, etc.) would require the operation/use of gasoline- or diesel-fueled construction equipment (e.g., excavators, trenchers, etc.) In addition, energy is needed to produce materials such as cement that may be used on site during construction. This would be a short-term energy use during construction activities. Such construction activities can be considered critical for the safe and efficient treatment of wastewater and would not result in significant environmental impacts from unnecessary or wasteful consumption of energy. Construction activities could also utilize energy efficient technologies and practices to reduce the likelihood of inefficient energy use. Overall, with appropriate planning and mitigation for construction activities involving energy use, potential energy impacts would be less than significant with mitigation.

Potential Impacts from Operation and Maintenance Activities

Operation and maintenance activities (O/M) from the installation of toxicity controls would result in an impact on energy use.

In 2005, the CEC published a study of energy consumption associated with water use by major economic sectors in California. This study estimated that a total of 2,012 gigawatt-hours of electricity and 27 million therms of natural gas were consumed in 2001 for wastewater treatment. These figures represented 0.8% of total statewide electricity consumption and 0.6% of total statewide natural gas consumption. This amounted to 2,500 kilowatt-hours per one million gallons of treated water (kWh/MG). (California Energy Commission, 2005). A review of this document, completed in 2006 by Navigant Consulting, Inc., recommended revising the average number to 1,911 kWh/MG (Navigant Consulting, Inc., 2006). Energy use for wastewater treatment is primarily consumed for moving wastewater from place to place (that is, pumping). Electrical energy consumed by wastewater treatment facilities is primarily from water pumping, and, in contrast to transportation of clean water supplies, “Wastewater pumps are inherently more inefficient because they must pump both liquids and solids” The other major energy use is of natural gas to heat anaerobic digestors. (California Energy Commission, 2005).

The amount of energy used for treatment will vary greatly from facility to facility due to the circumstances of the treatment system's location, treatment volume, and other physical characteristics. A significant factor is whether or not a facility is located uphill or downhill from the community it serves. "When they have a choice, agencies prefer to place water treatment facilities above their customers and the wastewater treatment facilities below, to harness the pull of gravity where possible, and to place water intakes above wastewater outfalls on rivers" (ibid.) Furthermore, energy consumption increases depending on the level of treatment. The simplest primary treatment involves removing of solid matter from the waste stream through screening or settling, while advanced tertiary treatment processes can require large amounts of electricity, such as for ultraviolet disinfection systems. The 2005 CEC report noted that "The number of water and wastewater treatment techniques and the combinations of techniques are expected to increase over time as more complex contaminants are discovered and regulated."

Technology has advanced since the publication of the 2005 CEC report. Many facilities throughout the state have already upgraded to or installed secondary or higher treatment systems. In addition, facilities have been implementing energy efficiency measures. For example, the Victor Valley Wastewater Reclamation Authority "…paired energy efficiency measures with an innovative energy recovery project to achieve a 27 [percent] improvement in energy intensity. These measures have saved the agency about $400,000 per year in energy costs, which represents about a third of its total energy bill" (U.S. Department of Energy 2017). An inherent opportunity for energy reuse in wastewater treatment, and therefore increased energy efficiency, is through capturing biogas generated from decomposition of biological material in wastewater and reusing it a heating source.

Although potential facility upgrades might require increased energy use, the use of that energy would be for the removal of toxicants from wastewater, which is neither wasteful, inefficient, or unnecessary. Furthermore, measures to improve the energy efficiency of wastewater treatment operations would at least in part offset new energy consumption.

Once installed, certain management practices may require ongoing energy use in their operation or maintenance. Of the structural controls identified in Chapter 6, several may result in ongoing energy use, including reverse osmosis and running wastewater through filters. Some of these systems rely on pumps to move water across filters or through a series of treatment operations. Some treatment processes may rely heavily on electricity use; whereas, sediment basins or bioreactors would require periodic removal of accumulated sediments/replacement of organic materials, which would involve energy use in operation of equipment and transportation of materials for disposal.

Due to the nature of the proposed project, and the fact that dischargers would have discretion as to which management practices to implement to comply with the Provisions, these effects cannot be quantified. However, based on the types of activities that are reasonably likely to occur, energy use under any proposed project associated with compliance with the Provisions, during construction, operation, and maintenance is not expected to be especially substantial, particularly when compared to existing conditions.

Various water treatment operations are ongoing and would continue to occur following adoption of the Provisions.

In general, the energy use that would occur under the proposed project would not be wasteful in the sense that implementation of water treatment operations are already required in non-storm water NPDES permits and are necessary for the protection and restoration of water quality throughout the state. Once installed, many reasonably foreseeable management practices under the proposed project would require relatively minimal energy use during operation and maintenance, and monitoring activities would use relatively limited amounts of energy. Additionally, as noted above, several reasonably foreseeable management practices (e.g., proper screening and flow equalization) could promote energy use efficiency over the long term.

Summary

The construction of structural controls could result in potentially significant environmental effects with regard to energy. Measures, however, can be applied to reduce and/or eliminate these impacts, as generally described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.7 Geology and Soils

7.5.7.1 Regulatory Background

Federal

Federal Earthquake Hazards Reduction Act

In October 1997, the U.S. Congress passed the National Earthquake Hazards Reduction (NEHR) Act to “reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program.” To accomplish this, the act established the National Earthquake Hazards Reduction Program (NEHRP). This program was significantly amended in November 1990 by the NEHR Act, which refined the description of agency responsibilities, program goals, and objectives.

NEHRP’s mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity;

and accelerated application of research results. The NEHR Act designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Other NEHR Act agencies include the National Institute of Standards and Technology, National Science Foundation, and the United State Geological Survey (USGS).

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed by the California Legislature to mitigate the hazard of surface faulting to structures. The act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Local agencies must regulate most development in fault zones established by the State Geologist. Before a project can be permitted in a designated Alquist-Priolo Fault Study Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (PRC Sections 2690–2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

National Pollutant Discharge Elimination System Permit (NPDES)

The State Water Board administers regulations and permitting for the U.S. EPA (55 CFR 47990) for pollution generated from storm water under the National Pollutant Discharge Elimination System (NPDES). The nine Regional Water Boards implement the State Water Board's jurisdiction and require that an operator of any construction activities with ground disturbances of 1.0 acre or more obtain a General Permit through the NPDES Storm Water Program. The General Permit requires that the implementations of BMPs be employed to reduce sedimentation into surface waters and control erosion. The preparation of a SWPPP addresses control of water pollution that includes the effects of sediments in the water during construction activities. These elements are further explained within Section 7.6.9, Hydrology and Water Quality.

California Building Standards Code

The State of California provides minimum standards for building design through the California Building Standards Code (CBC) (California Code of Regulations [CCR], Title 24). Where no other building codes apply, Chapter 29 regulates excavation, foundations, and retaining walls. The CBC also applies to building design and construction in the state and is based on the International Building Code (IBC) used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The CBC has been modified for California conditions with numerous more detailed and/or more stringent regulations.

7.5.7.2 Potential Impacts

Would the project:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

    i. Rupture of a known earthquake fault, as delineated in the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines & Geology Special Publication 42.

        The project would have a **less than significant impact**.

    ii. Strong seismic ground shaking?

        The project would have a **less than significant impact**.

    iii. Seismic-related ground failure, including liquefaction?

        The project would have a **less than significant impact**.

    iv. Landslides?

        The project would have a **less than significant impact**.

b) Result in substantial soil erosion or the loss of topsoil?

    The project would have a **potentially significant impact**.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

    The project would have a **potentially significant impact**.

d) Be located on expansive soils, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

    The project would have a **potentially significant impact**.

e) Have soils incapable of adequately supporting the use of septic tanks or alternate wastewater disposal systems where sewers are not available for the disposal of wastewater?

The project would have **no impact**.

f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

The project would have a **potentially significant impact**.

7.5.7.3 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Monitoring is not expected to directly cause geological impacts nor impacts to soils (items a-f). No mitigation is required.

Potential Impacts from Structural Control Construction

No construction of a toxicity control is anticipated to expose people or structures to substantial adverse effects from geologic hazards (item a).

Construction of a structural control could result in substantial erosion (item b), create geologic instability (item c), or be located in expansive soils (item d). Of the project-specific environmental documents reviewed, the facility upgrade projects identified a range of potential impacts related to geology and soils from no impact to less than significant with mitigation. Most of the agencies conducted geotechnical studies prior to their environmental impact analyses and others required a geotechnical study prior to construction. Those that conducted geotechnical studies were able to make more “no impact” determinations based on those studies.

To the extent that construction occurs in areas subject to geologic hazards, such as, ground shaking, liquefaction, liquefaction-induced hazards, or landslides, geotechnical studies prepared as part of the pre-design process would identify site-specific soil and subsurface conditions and specify design features that would keep potential seismic related impacts within acceptable levels. Compliance with existing regulations, building codes, and standards specifications would also keep potential impacts within acceptable levels. The most appropriate measure for potential fault rupture hazards is avoidance (e.g., building setbacks), as most surface faulting is confined to a relatively narrow zone a few feet to tens of feet wide (California Geological Survey 2002). To the extent that construction activities causes an increase in erosion, typical established best management practices would be used during implementation to minimize offsite sediment runoff or deposition. Construction sites are required to retain sediments on site. A less than significant impact is anticipated after these measures are taken.

To the extent that construction activities could result in ground instability, potential impacts could be avoided or mitigated through mapping, to site facilities away areas with unsuitable soils or steep slopes; design and installation in compliance with existing regulations; standard specifications and building codes; ground improvements such as soil compaction; and groundwater level monitoring to ensure stable conditions. A less than significant impact is anticipated after these measures are taken.

To the extent that any soil is disturbed during construction, standard construction techniques, including but not limited to, shoring, piling, and soil stabilization can alleviate any potential impacts. Prior to earthwork, a geotechnical study should be conducted to evaluate geology and soil conditions. A less than significant impact is anticipated after these measures are taken.

Facilities that treat or discharge wastewater would need to be located in areas where soil is adequate for treatment and/or disposal of wastewater or where they have access to adequate treatment facility resources. No impact from the Provisions.

Potential Impacts from Operation and Maintenance Activities

Operation and maintenance activities (O/M) from the installation of toxicity controls would not result in an impact to geology and soils (items a-f). O/M may occur inside buildings, or within previously developed area. In addition, O/M would not be expected to lead to ground disturbing activities or affect the use of septic systems (item e). Therefore, no impact is expected.

Summary

The installation of structural controls could result in potentially significant environmental effects with regard to geology and soils. However, measures can be applied to reduce and/or eliminate these impacts, as described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.8 Greenhouse Gas Emissions

General scientific consensus and increasing public awareness regarding global warming and climate change have placed new focus on the CEQA review process as a means to address the effects of greenhouse gas emissions from proposed projects on climate change.

Global warming refers to the recent and ongoing rise in global average temperature near Earth's surface. It is caused mostly by increasing concentrations of greenhouse gases in the atmosphere. Global warming is causing climate patterns to change. Global warming itself, however, represents only one aspect of climate change.

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.

Increases in the concentrations of greenhouse gases in the Earth's atmosphere are thought to be the main cause of human-induced climate change. Greenhouse gases naturally trap heat by impeding the exit of infrared radiation that results when incoming ultraviolet solar radiation is absorbed by the Earth and re-radiated as infrared radiation. The principal greenhouse gases associated with anthropogenic emissions are carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, perfluorocarbon, nitrogen trifluoride, and hydrofluorocarbon (Health and Safety Code, § 38505, subdivision (g); CEQA Guidelines, § 15364.5). Water vapor is also an important greenhouse gas, in that it is responsible for trapping more heat than any of the other greenhouse gases. Water vapor, however, is not a greenhouse gas of concern with respect to anthropogenic activities and emissions. Each of the principal greenhouse gases associated with anthropogenic climate warming has a long atmospheric lifetime (one year to several thousand years). In addition, the potential heat trapping ability of each of these gases vary significantly from one another. Methane for instance is 23 times more potent than carbon dioxide, while sulfur hexaflouride is 22,200 times more potent than carbon dioxide (Intergovernmental Panel on Climate Change 2007). Conventionally, greenhouse gases have been reported as "carbon dioxide equivalents." Carbon dioxide equivalents take into account the relative potency of non-carbon dioxide greenhouse gases and convert their quantities to an equivalent amount of carbon dioxide so that all emissions can be reported as a single quantity.

The primary man-made processes that release these greenhouse gases include: (1) burning of fossil fuels for transportation, heating and electricity generation, which release primarily carbon dioxide; (2) agricultural practices, such as livestock grazing and crop residue decomposition and application of nitrogen fertilizers, that release methane and nitrous oxide; and (3) industrial processes that release smaller amounts of high global warming potential gases.

7.5.8.1 Regulatory Background

In 2005, Executive Order S-3-05 proclaimed that California is vulnerable to the effects of climate change. To combat those concerns, the Executive Order established a long-range greenhouse gas reduction target of 80percent below 1990 levels by 2050.

Subsequently, Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006 (Chapter 488, Statutes of 2006, enacting § 38500-38599 of the Health and Safety Code) was signed. AB 32 requires California to reduce statewide greenhouse gas emissions to 1990 levels by 2020. AB 32 directed the California Air Resources Board to develop and implement regulations that reduce statewide greenhouse gas emissions.

Executive Order B-30-15 and Senate Bill (SB) 32 (Chapter 249, Statutes of 2016, enacting § 38566 of the Health and Safety Code) extended the goals of Ab 32 and set a goal of reducing emissions 40 percent from 1990 levels.

The Climate Change Scoping Plan approved by the California Air Resources Board in December 2017, outlines the State’s plan to achieve the greenhouse gas reductions required in AB 32 and SB 32.

SB 97, signed in August 2007 (Chapter 185, Statutes of 2007, enacting § 21083.05 and 21097 of the Public Resources Code), acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the Office of Planning and Research to prepare, develop, and transmit guidelines for the feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions to the California Resources Agency.

Office of Planning and Research developed a technical advisory suggesting relevant ways to address climate change in CEQA analyses. The technical advisory also lists potential mitigation measures, describes useful computer models, and points to other important resources. In addition, amendments to CEQA guidelines implementing SB 97 became effective on March 18, 2010.

7.5.8.2 Potential Impacts

Would the project:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

   The project would have a **potentially significant impact**.

b) Conflict with an applicable plan, policy or regulation of adopted for the purpose of reducing the emissions of greenhouse gases?

   The project would have **no impact**.

7.5.8.3 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Monitoring involves the possible use of vehicles to and from the sample location, and to the laboratory. The monitoring requirements in the Provisions are not expected to cause a significant increase in greenhouse gas emissions for the same reasons outlined in Section 7.5.3.3 above. The impacts of greenhouse gas emissions resulting from the implementation of the Provisions are considered less than significant (items a and b). No mitigation is required.

Potential Impacts from Structural Control Construction

The operation of construction equipment would generate greenhouse gas emissions over baseline conditions (item a). Greenhouse gas emissions due to construction equipment would be short-term and therefore would not significantly increase greenhouse gas levels in the environment. Greenhouse gas levels are not expected to rise significantly since mitigation measures are available to reduce greenhouse gas emissions due to construction activities.

The California Department of Water Resources has developed a set of BMPs to reduce greenhouse gas emissions from California Department of Water Resources construction and maintenance activities (California Department of Water Resources 2012). These BMPs can be used and/or modified to fit specific situations by the implementing agencies to reduce greenhouse gas emissions from their activities:

BMP 1. Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high efficiency technologies are appropriate and feasible for the project or specific elements of the project.

BMP 2. Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines.

BMP 3. Ensure that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels, such as propane or solar, to power generators to the maximum extent feasible.

BMP 4. Evaluate the feasibility and efficacy of producing concrete on-site and specify that batch plants be set up on-site or as close to the site as possible.

BMP 5. Evaluate the performance requirements for concrete used on the project and specify concrete mix designs that minimize greenhouse gas emissions from cement production and curing while preserving all required performance characteristics.

BMP 6. Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by the State airborne toxics control measure [Title 13,

§ 2485 of the CCR]). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.

BMP 7. Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer’s recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an Air Quality Control Plan prior to commencement of construction.

BMP 8. Implement tire inflation program on jobsite to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every two weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an Air Quality Management Plan prior to commencement of construction.

BMP 9. Develop a project specific ride share program to encourage carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes.

BMP 10. Reduce electricity use in temporary construction offices by using high efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.

BMP 11. For deliveries to project sites where the haul distance exceeds 100 miles and a heavy-duty class 7 or class 8 semi-truck or 53-foot or longer box type trailer is used for hauling, a SmartWay7 certified truck would be used to the maximum extent feasible.

The Provisions would not conflict with any plan, amendment, or regulation adopted for the purpose of reducing greenhouse gas emissions (item b). Most greenhouse gas reduction

[7] The U.S EPA has developed the SmartWay truck and trailer certification program to set voluntary standards for trucks and trailers that exhibit the highest fuel efficiency and emissions reductions. These tractors and trailers are outfitted at point of sale or retrofitted with equipment that significantly reduces fuel use and emissions including idle reduction technologies, improved aerodynamics, automatic tire inflation systems, advanced lubricants, advanced powertrain technologies, and low rolling resistance tires.

plans include replacing government owned vehicles with low or zero-emission vehicles (City of Citrus Heights 2011, California Department of Water Resources 2012, ICF International 2015, City of Pasadena 2017). Implementation of greenhouse gas reduction plans could reduce greenhouse gas emissions from activities undertaken to comply with the Provisions.

In 2007, the California Air Resources Board adopted the In-Use Off-Road Diesel Vehicle Regulation (CCR, title 13, article 4.8, chapter 9) which, when fully implemented, would significantly reduce emissions from off-road, non-agricultural, diesel vehicles with engines greater than 25 horsepower—the types of vehicles typically used in construction activities. The overall purpose of the Off-Road regulation is to reduce emissions of oxides of nitrogen (NOx) and particulate matter (PM) from off-road diesel vehicles operating within California. The regulation limits vehicle idling, requires sales disclosure requirements, and reporting and labeling requirements, and restricts adding older vehicles to a fleet. When the regulation is fully implemented, owners of fleets of off-road (non-agricultural) diesel vehicles would have to upgrade the performance of their vehicle fleets to comply with the regulation.

The California Air Resources Board Scoping Plan (California Air Resources Board 2017) proposes a comprehensive set of actions designed to achieve the 2030 greenhouse gas emissions reductions required under SB 32. In addition, other efforts by the California Air Resources Board would reduce air pollutant emissions through 2020, including the Diesel Risk Reduction Plan (California Air Resources Board 2000). Measures in these plans would result in the accelerated phase-in of cleaner technology for virtually all of California's diesel engine fleets including trucks, buses, construction equipment, and cargo handling equipment at ports.

Potential Impacts from Operation and Maintenance Activities

Greenhouse gas emissions associated with O/M activities consist of emissions from electricity consumption, natural gas consumption, nitrogen off-gassing from process wastewater discharge, methane containing biogas, and mobile source emissions from employee commute and facility vehicular use. These O/M activities are mostly associated with POTW and industrial wastewater treatment facilities where pump stations and other machinery are utilized in the treatment process.

Passive treatment controls such as catch basins only require periodic maintenance and any greenhouse gas emissions associated with equipment use would be minimal.

All of the projects reviewed determined there would be a less than significant increase in greenhouse gas emissions related to O/M activities, except the EchoWater Project. They found that there would be a significant increase in greenhouse gas emissions, mostly related to increases in electrical use by new equipment and the emissions generated from electricity production. They identified the following measures to reduce the consumption of non- renewable energy and thereby reduce the amount of greenhouse gas emissions:

- active participation in the Sacramento Municipal Utility District (SMUD)

"Greenergy" program, which allows customers to direct (for additional cost) SMUD to supply electricity from renewable sources;

- providing onsite renewable energy such as solar panels, or similar means to offset fossil fuel-powered electricity generation; or
- purchasing greenhouse gas offsets.

With the incorporation of these measures, along with those related to construction generated greenhouse gas emissions, they found that there would be a less than significant impact on the environment (items a and b).

Summary

The installation of structural controls, and in some cases O/M activities, could result in potentially significant environmental effects with regard to greenhouse gas emissions. Measures, however, can be applied to reduce and/or eliminate these impacts, as generally described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.9 Hazards and Hazardous Materials

Hazards and hazardous materials are located throughout the urbanized portion of the state either as naturally occurring or man-made hazards. Contaminated soil and groundwater from commercial and industrial sites such as gas stations, dry cleaners, and manufacturing facilities are located throughout the state. Aboveground and underground storage tanks contain vast quantities of hazardous substances. Thousands of these tanks have leaked or are leaking, discharging petroleum fuels, solvents, and other hazardous substances into the subsurface.

These leaks as well as other discharges to the subsurface that result from inadequate handling, storage, and disposal practices can seep into the subsurface and pollute soils and groundwater. Both naturally occurring hazards and anthropogenic contaminated soils and groundwater could be encountered during construction activities. Construction and operation and maintenance of a toxicity control may also involve transporting or handling waste material that is associated with some hazard or hazardous substances.

7.5.9.1 Regulatory Background

Definition of Hazardous Material

A material is considered hazardous if it appears on a list of hazardous materials prepared by a Federal, State, or local agency, or if it has characteristics defined as hazardous by such an agency. A hazardous material is defined in Title 22 of the CCR as:

> A substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed" (CCR, Title 22, Section 66260.10).

Federal

Resource Conservation and Recovery Act

The primary Federal agency regulating the generation, transport, and disposal of hazardous substances is EPA, under the authority of the Resource Conservation and Recovery Act (RCRA). RCRA established an all-encompassing Federal regulatory program for hazardous waste that is administered in California by DTSC. Under RCRA, DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was amended in 1984 by the Hazardous and Solid Waste Amendments of 1984, which specifically prohibits the use of certain techniques for the disposal of various hazardous waste. The Federal Emergency Planning and Community Right-to-Know Act of 1986 imposes planning requirements to help protect local communities in the event of accidental release of an extremely hazardous substance.

Clean Air Act

Regulations under the Clean Air Act (42 U.S. Code [USC] 7401 et seq. as amended) are designed to prevent accidental releases of hazardous materials. The regulations require facilities that store a threshold quantity or greater of listed regulated substances to develop a risk management plan, including hazard assessments and response programs to prevent accidental releases of listed chemicals.

Toxic Substances Control Act/Resource Conservation and Recovery Act/Hazardous and Solid Waste Act

The Federal Toxic Substances Control Act of 1976 (15 USC 2605) and the Resource Conservation and Recovery Act of 1976 (42 USC 6901 et seq.) established a program administered by the U.S. EPA for the regulation of the generation, transportation, treatment, storage, and disposal of hazardous waste. The Resource Conservation and Recovery Act was amended in 1984 by the Hazardous and Solid Waste Act, which affirmed and extended the "cradle to grave" system of regulating hazardous wastes.

U.S. Department of Transportation Hazardous Materials Transport Act

The U.S. Department of Transportation, in conjunction with the U.S. EPA, is responsible for enforcement and implementation of federal laws and regulations pertaining to transportation of hazardous materials. The Hazardous Materials Transportation Act of 1974 (49 USC 5101) directs the U.S. Department of Transportation to establish criteria and regulations regarding the safe storage and transportation of hazardous materials. Code of Federal Regulations (CFR) 49, 171–180, regulates the transportation of hazardous materials, types of material defined as hazardous, and the marking of vehicles transporting hazardous materials.

State

Safe Drinking Water and Toxics Enforcement Act

The Safe Drinking Water and Toxics Enforcement Act of 1986 (Proposition 65) identifies chemicals that cause cancer and reproductive toxicity, provides information for the public, and prevents discharge of the chemicals into sources of drinking water. Lists of the chemicals of concern are published and updated periodically. Businesses are required to notify Californians about the chemicals in products they purchase, in the workplace, or that are released to the environment. By providing this information, individuals are able to make informed decisions about protecting themselves from exposure to these chemicals.

Hazardous Waste Control Act

The Hazardous Waste Control Act created the State hazardous waste management program. It is similar to, but more stringent than, the federal Resource Conservation and Recovery Act program. The act is implemented by regulations contained in Title 26 of the CCR, which describes the following required aspects for the proper management of hazardous waste: identification and classification; generation and transportation; design and permitting of recycling treatment, storage and disposal facilities; operation of facilities and staff training; and closure of facilities and liability requirements. These regulations list more than 800 materials that may be hazardous and establish criteria for identifying, packaging, and disposing of such waste. Under the Hazardous Waste Control Act and Title 26, the generator of hazardous waste must complete a manifest that accompanies the waste from generator to transporter to the ultimate disposal location. Copies of the manifest must be filed with the DTSC.

7.5.9.2 Potential Impacts

Would the project:

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

   The project would have a **potentially significant impact**.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

The project would have a **potentially significant impact**.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school?

The project would have **no impact**.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result, would it create a significant hazard to the public or to the environment?

The project would have a **potentially significant impact**.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or a public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

The project would have a **less than significant impact**.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

The project would have a **less than significant impact**.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

The project would have a **potentially significant impact**.

h) Expose people or structures, either directly or indirectly, to a significant loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The project would have a **potentially significant impact**.

7.5.9.3 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Proper safety precautions must be observed when collecting wastewater samples. Wastewater workers can be exposed to wastewater pathogens and toxins through several pathways.

Exposure can be prevented by taking basic safety measure that include:

- respiratory exposure - face shield and masks protect from droplets and aerosols
- dermal exposure - gloves and hand hygiene protect from direct contact
- surface (fomite) exposure - barriers between skin and surfaces protect from wastewater and plant equipment contact

Dischargers, or contractors engaged to conduct sampling for dischargers, should have some sort of risk management plan or safety management program that identifies the equipment, maintenance, inspection, and training associated with the procedures used in collecting wastewater samples. Adherence to these plans and/or programs should reduce the risk of exposure to less than significant levels. In addition, collection of wastewater samples already occurs in compliance with various programs and requirements. The Provisions would not lead to a significant increase in exposure to dischargers or contractors collecting wastewater samples.

The wastewater samples that are collected and transported are not classified as hazardous waste and do not pose the same risk to the public that hazardous waste does. No special disposal is required for water or test organisms from non-toxic samples or for the controls. These samples are simply poured down the drain. For samples that test positive for a specific pollutant or toxicity of unknown origin, the samples are poured into the appropriate evaporation drum. The amount of precipitate left behind is so minute that it will take decades for any appreciable amount of material to accumulate in the drums (pers. comm., AquaScience).

Therefore, any increase in the amount of sampling required due to the Provisions will not cause any significant increase in hazards to the public or the environment through the routine transport, use, or disposal of hazardous materials (item a), or through reasonably foreseeable upset and accident conditions that would lead to the release of hazardous materials in the environment (item b). No mitigation required.

Potential Impacts from Structural Control Construction

Both naturally occurring hazards and anthropogenic contaminated soils and groundwater could be encountered during construction activities. Construction may also involve transporting or handling waste material that is associated with some hazard or hazardous substances.

To the extent that construction activities could involve work with or near hazards or hazardous materials (item a and b), potential risks of exposure can be alleviated with proper handling and storage procedures. The health and safety plan prepared for any project should address potential effects from cross contamination and worker exposure to contaminated soils and water and should include a plan for temporary storage, transportation and disposal of contaminated soils and water. Compliance with the requirements of California Occupational Health and Safety Administration and local safety regulations during construction would prevent any worksite accidents or accidents involving the release of hazardous materials into the environment, which could harm the public, nearby residents and sensitive receptors such as schools. Sites can be properly protected with fencing and signs to prevent accidental health hazards. To the extent that construction could interfere with emergency response or evacuation plans, traffic control plans should be used to manage traffic through installation zones.

Overall, the five facility upgrade projects reviewed identified a range of potential impacts related to hazards and hazardous materials from no impact to less than significant with mitigation. Site specific measures to implement BMPS to prevent contamination of surface and groundwater and to remove hazardous materials where possible could reduce or eliminate any significant impacts.

No toxicity controls or treatment systems should emit hazardous emission near any school (item c). Construction may take place in a site with hazardous materials (item d), however proper management practices can be used to create a less than significant hazard to the public or the environment. No methods of compliance will foreseeably affect the operation of airports (item e and f), or risk of wildland fires (item h). Structural controls may also be located in or around forested areas where wildfires may present a hazard. Proper safety practices during construction and maintaining safe clearance zones around any structures would mitigate any potential threats from wildfires.

Potential Impacts from Operation and Maintenance Activities

Some of the possible toxicity controls identified in Chapter 6 require the use of chemicals such as chlorine gas and sodium hypochlorite. These and other hazardous materials are routinely transported, stored and used at various treatment facilities.

Overall, the five projects reviewed by the State Water Board determined that they would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, nor would they create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment because comprehensive procedures and plans are in place, are followed, and will continue to be adhered with to prevent the release of hazardous materials onsite.

In the case of the EchoWater Project, changing from gas (chlorine gas and sulfur dioxide) to liquid (sodium hypochlorite and sodium bisulfate) processing for disinfection and de-chlorination would reduce the potential for exposure of people and the environment to hazardous chemicals.

Summary

The installation of structural controls could result in potentially significant environmental effects with regard to hazards and hazardous material (item a, b, and g). Measures, however, can be applied to reduce and/or eliminate these impacts, as generally described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.10 Hydrology and Water Quality

7.5.10.1 Potential Impacts

Would the project:

a) Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality?

   The project would have a **less than significant impact**.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)??

   The project would have **no impact.**

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

   The project would have a **potentially significant impact**.

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

   The project would have a **potentially significant impact**.

e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?

   The project would have **no impact**.

f) Otherwise substantially degrade water quality?

The project would have a **potentially significant impact**.

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

The project would have **no impact.**

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

The project would have **no impact.**

i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?

The project would have **no impact.**

j) Inundation by seiche, tsunami, or mudflow?

The project would have **no impact.**

k) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

The project would have **no impact**.

l) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The project would have **no impact**.

7.5.10.2 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Monitoring will not adversely affect hydrology or water quality. In fact, the Provisions provide a mechanism for detecting toxicity and initiating a series of steps to identify the toxicant and develop corrective actions which will protect water quality. No mitigation required.

Potential Impacts from Structural Control Construction

Construction-related activities could cause temporary exceedances of receiving water quality objectives or other adverse effects to beneficial uses (item a). The potential for temporary construction-related contaminant discharges to cause exceedances of water quality objectives and adverse effects to beneficial uses would be less than significant with the implementation of management practices and controls to avoid and minimize potential adverse construction- related water quality effects, as described in more detail below.

Construction activities could involve earthwork such as grading, excavation, trenching, backfilling, hauling, compaction, and could include extensive soil borrow and disposal activities. Additionally, underground piping, conduits and galleries could be constructed. Construction also could involve paving, lighting, drainage, reinforced concrete, steel structures, delivery of construction materials and supplies to the site, and off-hauling of demolished and excavated material. Typical construction activities would require all terrain vehicles, forklifts, cranes, pick- up and fuel trucks, compressors, loaders, backhoes, excavators, dozers, scrapers, pavement compactors, welders, concrete pumps and concrete trucks, and off-road haul trucks.

Construction also would require temporary staging areas for storage of construction materials, fuels, equipment, and vehicles.

As a result of the extensive disturbance, the construction sites would be exposed to potential for soil erosion and runoff of construction-related contaminants and soil from seasonal rainfall (item c, d and f). Graded and exposed soils also can be compacted by heavy machinery, resulting in reduced infiltration of rainfall and runoff, thus increasing the rate of runoff of contaminants, or increasing offsite erosion and sedimentation into offsite receiving waters. Potential construction-related contaminant discharges and water quality effects include increased concentrations and loading of organic matter, nutrients (nitrogen and phosphorus), and other remnant historical contaminants that may be contained in the soil (e.g., trace metals, pesticides). Deep excavations for foundations and trenches may encounter shallow groundwater requiring site dewatering, which also can result in discharge of suspended sediment, turbidity, or other contaminants. Construction activities also would be anticipated to involve the storage, transport, handling, and use of a variety of hazardous substances and non- hazardous materials that may adversely affect surface and groundwater quality if discharged in stormwater runoff or directly to water bodies. Typical construction-related contaminants include petroleum products for refueling and maintenance of machinery (e.g., fuel, oils, solvents), concrete, paints and other coatings, cleaning agents, debris and trash, and human wastes.

Construction activities also involve the potential for accidental spills of hazardous materials stored and used for construction.

A Water Pollution Control Plan (WPCP) should be prepared for construction activities on one acre of land or less. If the project involves land disturbance of an area in excess of one acre, coverage should be sought under the State Water Board's NPDES Construction General Permit (Order No. 2009-0009-DWQ/NPDES Permit No. CAS000002 and all amendments). The Construction General Permit requires the preparation of a Stormwater Pollution Prevention Plan (SWPPP).

The WPCP and/or SWPPP prepared for a project should describe the BMPs to be used to avoid and minimize potential adverse construction-related water quality effects. Construction designs, drawings, and contracts for construction activities should refer to and accommodate the requirements of the WPCP/SWPPP. All water quality, erosion, and sediment control measures included in the WPCP/SWPPP should be implemented as specified. The WPCP/SWPPP also should identify responsibilities of construction contractors for implementation and inspection of BMPs, and training elements for the personnel responsible for installation and maintenance of the BMPs.

Plan measures may include, but are not limited to, the following general categories of BMPs that have proven successful at reducing adverse water quality effects:

- Waste Management and Spill Prevention and Response: Waste management BMPs are designed to minimize exposure of waste materials at all construction sites and staging areas such as waste collection and disposal practices, containment and protection of wastes from wind and rain, and equipment cleaning measures. Spill prevention and response BMPs involve planning, equipment, and training for personnel for emergency event response.
- Erosion and Sedimentation Control: Erosion control BMPs are designed to prevent erosion processes or events including scheduling work to avoid rain events, stabilizing exposed soils; minimize offsite sediment runoff; remove sediment from onsite runoff before it leaves the site; and slow runoff rates across construction sites. Identification of appropriate temporary and long-term seeding, mulching, and other erosion control measures as necessary. Sedimentation BMPs are designed to minimize offsite sediment runoff once erosion has occurred involving drainage controls, perimeter controls, detention/sedimentation basins, or other containment features.
- Good Housekeeping and Non-Stormwater Discharge Management: Good housekeeping BMPs are designed to reduce exposure of construction sites and materials storage to stormwater runoff including truck tire tracking control facilities; equipment washing; litter and construction debris; and designated refueling and equipment inspection/maintenance practices. Non-stormwater discharge management BMPs involve runoff measures for contaminants not directly associated with rain or wind including vehicle washing and street cleaning operations.
- Construction Site Dewatering and Pipeline Testing: Dewatering BMPs involve actions to prevent discharge of contaminants present in dewatering of groundwater during construction, discharges of water from testing of pipelines or other facilities, or the indirect erosion that may be caused by dewatering

discharges.

- BMP Inspection and Monitoring: Identification of clear objectives for evaluating compliance with WPCP and/or SWPPP provisions, and specific BMP inspection and monitoring procedures, environmental awareness training, contractor and agency roles and responsibilities, reporting procedures, and communication protocols.

With implementation of these measures, potential impacts to water quality from construction related activities should be reduced to a less-than-significant level.

Potential Impacts from Operation and Maintenance Activities

The State Water Board expects that any future changes to O/M activities as a result of facility upgrades will also have a less than significant impact on hydrology and water quality. O/M activities after construction would be similar to O/M activities before construction. By installing a toxicity control, water quality is expected to improve by the reduction in toxicity entering water.

The Provisions would establish water quality standards, to be implemented through WDRs, waivers of WDRs, or Certifications and therefore would not violate any water quality standards or WDRs (item a) or otherwise degrade water quality (item f). The Provisions would not increase the use of ground water (item b), and would not increase groundwater recharge (item b). The Provisions would not place housing or other structures within a 100-year flood hazard area (item g and h), nor would it expose people and structures to a significant risk of loss, injury, or death by flooding, seiche, tsunami, or mudflow (item i j and k). The Provisions would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan (item l).

Summary

The installation of structural controls could result in potentially significant environmental effects with regard to hydrology and water quality. Measures, however, can be applied to reduce and/or eliminate these impacts, as generally described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.11 Land Use and Planning

7.5.11.1 Potential Impacts

Would the project:

a) Physically divide an established community?

The project would have **no impact**.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

The project would have **no impact**.

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

The project would have **no impact**.

7.5.11.2 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

The Provisions would not physically divide an established community nor conflict with any applicable habitat conservation plan or natural community conservation plan (item a, b, and c). On the remote chance that measures will need to be taken to establish controls for a toxicant, the existing facilities should already be in compliance with existing land use plans. Any upgrades that may be required are also not expected to conflict with any land use plans. No mitigation required.

7.5.12 Mineral Resources

7.5.12.1 Potential Impacts

Would the project:

Result in the loss of availability of a known mineral resource that would be of future value to the region and the residents of the State?

The project would have a **less than significant impact**.

Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

The project would have a **less than significant impact**.

7.5.12.2 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

The Provisions will not have significant impact on mineral resources (item a and b). Any mineral resources that may occur within areas where new or upgraded treatment controls may be needed will have already been made unavailable by the existence of the current land uses and related infrastructure. Implementation of the Provisions will not further impact any potential mineral resources. No mitigation required.

7.5.13 Noise and Vibration

7.5.13.1 Background

Noise

California Health and Safety Code section 46022 defines noise as “excessive undesirable sound, including that produced by persons, pets and livestock, industrial equipment, construction, motor vehicles, boats, aircraft, home appliances, electric motors, combustion engines, and any other noise-producing objects”. The degree to which noise can affect the human environment range from levels that interfere with speech and sleep (annoyance and nuisance) to levels that cause adverse health effects (hearing loss and psychological effects). Human response to noise is subjective and can vary greatly from person to person. Factors that influence individual response include the intensity, frequency, and pattern of noise; the amount of background noise present before the intruding noise; and the nature of work or human activity that is exposed to the noise source.

Sound results from small and rapid changes in atmospheric pressure. These cyclical changes in pressure propagate through the atmosphere and are often referred to as sound waves. The greater the amount of variation in atmospheric pressure (amplitude) leads to a greater loudness (sound level). Sound levels are most often measured on a logarithmic scale of decibels (dB).

The decibel scale compresses the audible acoustic pressure levels which can vary from 20 micro-Pascals (μPa), the threshold of hearing and reference pressure (0 dB), to 20 million μPa, the threshold of pain (120 dB) (Air & Noise Compliance 2006). Tables 7-4 and 7-5 provide examples of noise levels from common sounds.

To determine ambient (existing) noise levels, noise measurements are usually taken using various noise descriptors. The following are brief definitions of typical noise measurements:

Community Noise Equivalent Level

The community noise equivalent level is an average sound level during a 24-hour day. The community noise equivalent level noise measurement scale accounts for noise source, distance, single-event duration, single-event occurrence, frequency, and time of day. Humans react to sound between 7:00 p.m. and 10:00 p.m. as if the sound were actually 5 decibels higher than if it occurred from 7:00 a.m. to 7:00 p.m. From 10:00 p.m. to 7:00 a.m., humans perceive sound as if it were 10 dBA higher than if it occurred from 7:00 a.m. to 7:00 p.m. due to the lower background noise level. Hence, the community noise equivalent level noise measurement scale is obtained by adding an additional 5 decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m., and 10 A-weighted decibels (dBA) to sound levels in the night after 10:00 p.m. and before 7:00 a.m. Because community noise equivalent level accounts for human sensitivity to sound, the community noise equivalent level 24-hour figure is always a higher number than the actual 24-hour average.

Equivalent Noise Level

Equivalent noise level is the average noise level on an energy basis for any specific time period. The equivalent noise level for 1 hour is the energy average noise level during the hour. The average noise level is based on the energy content (acoustic energy) of the sound. Equivalent noise level can be thought of as the level of a continuous noise that has the same energy content as the fluctuating noise level. The equivalent noise level is expressed in units of dBA.

Sound Exposure Level

Sound exposure level is a measure of the cumulative sound energy of a single event. This means that louder events have greater sound exposure level than quieter events. Additionally, events that last longer have greater sound exposure level than shorter events.

Table 7-4. Common Outdoor Sound Levels

Outdoor Sound Levels	Sound Pressure (μPa)	Sound Level A-Weighted decibels (dBA)
Jet Over-flight at 300 meters	3,556,559	105
Gas Lawn Mower at 1 meter	1,124,683	95
Diesel Truck at 15 meters	355,656	85
Noisy Urban Area (daytime)	200,000	80
Gas Lawn Mower at 30 meters	63,246	70
Suburban Commercial Area	35,566	65
Quiet Urban Area (daytime)	11,247	55
Quiet Urban Area (nighttime)	3,557	45
Quiet Suburb (nighttime)	1,125	35
Quiet Rural Area (nighttime)	356	25
Rustling Leaves	200	20
Reference Pressure Level	20	0

Table 7-5. Common Indoor Sound Levels

Indoor Sound Levels	Sound Pressure (μPa)	Sound Level A-Weighted decibels (dBA)
Rock Band at 5 meters	6,324,555	110
Inside NY Subway Train	2,000,000	100
Food Blender at 1 meter	632,456	90
Garbage Disposal at 1 meter	200,000	80
Shouting	112,468	75
Vacuum Cleaner at 3 meters	63,246	70
Normal Speech at 1 meter	35,566	65
Quiet Conversation at 1 meter	11,247	55
Dishwasher in Adjacent Room	6,325	50
Empty Theater of Library	2,000	40
Quiet Bedroom at Night	632	30
Empty Concert Hall	356	25
Broadcast and Recording Studios	112	15
Threshold of Hearing	20	0

Source: Air & Noise Compliance 2006.

Audible Noise Changes

Studies have shown that the smallest perceptible change in sound level for a person with normal hearing sensitivity is approximately 3 decibels. A change of at least 5 decibels would be noticeable and likely would evoke a community reaction. A 10-decibel increase is subjectively heard as a doubling in loudness and would most certainly cause a community response. Noise levels decrease as the distance from the noise source to the receiver increases. Noise generated by a stationary noise source, or "point source," would decrease by approximately 6 decibels over hard surfaces and 9 decibels over soft surfaces for each doubling of the distance. For example, if a noise source produces a noise level of 89 dBA at a reference distance of 50 feet, then the noise level would be 83 dBA at a distance of 100 feet from the noise source, 77 dBA at a distance of 200 feet, and so on over hard surfaces. Generally, noise is most audible when traveling along direct line-of-sight. Barriers, such as walls, berms, or buildings that break the line-of-sight between the source and the receiver greatly reduce noise levels from the source because sound can reach the receiver only by bending over the top of the barrier (diffraction). Sound barriers can reduce sound levels by up to 20 dBA. If a barrier, however, is not high or long enough to break the line-of-sight from the source to the receiver, its effectiveness is greatly reduced.

Sensitive Receptors

Land uses that are considered sensitive to noise impacts are referred to as "sensitive receptors." Noise-sensitive receptors consist of, but are not limited to, schools, religious institutions, residences, libraries, parks, hospitals, and other care facilities.

Vibration

In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving and operating heavy earth-moving equipment. The effects of ground-borne vibration include feelable movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. A vibration level that causes annoyance would be well below the damage threshold for normal buildings.

The background vibration velocity level in residential areas is usually 50 VdB or lower, well below the threshold of perception for humans which is around 65 VdB. Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people or slamming of doors. Typical outdoor sources of perceptible ground- borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB to 100 VdB. Background vibration is usually well below the threshold of human perception and is of concern only when the vibration affects very sensitive manufacturing or research equipment. Electron microscopes and high-resolution lithography equipment are typical of equipment that is highly sensitive to vibration.

7.5.13.2 General Setting

Noise

Existing noise environments will vary considerably based on the diversity of land uses and densities. In most urban environments, automobile, truck, and bus traffic is the major source of noise. Traffic generally produces background sound levels that remain fairly constant with time. Individual high-noise-level events that can occur from time to time include honking horns, sirens, operation of construction equipment, and travel of noisy vehicles like trucks or buses. Air and rail traffic and commercial and industrial activities are also major sources of noise in some areas. In addition, air conditioning and ventilating systems contribute to the noise levels in residential areas, particularly during the summer months.

Regulatory Background

The no longer extant California Office of Noise Control, California Department of Health Services developed guidelines showing a range of noise standards for various land use categories in the 1976 Noise Element Guidelines. These guidelines are now found in Appendix C of the State of California General Plan Guidelines (Governor's Office of Planning and Research 2003). Cities within the state have generally incorporated this compatibility matrix into their General Plan noise elements. These guidelines are meant to maintain acceptable noise levels in a community setting based on the type of land use. Noise compatibility by different types of land uses is a range from "Normally Acceptable" to "Clearly Unacceptable" levels. The guidelines are used by cities within the state to help determine the appropriate land uses that could be located within an existing or anticipated ambient noise level.

Some of the reasonably foreseeable methods of compliance have the potential to affect noise levels. Noise within counties and cities are regulated by noise ordinances, which are found in the municipal code of the jurisdiction These noise ordinances limit intrusive noise and establish sound measurements and criteria, minimum ambient noise levels for different land use zoning classifications, sound emission levels for specific uses, hours of operation for certain activities (such as construction and trash collection), standards for determining noise deemed a disturbance of the peace, and legal remedies for violations.

Vibration

Major sources of groundborne vibration would typically include trucks and buses operating on surface streets, and freight and passenger train operations. The most significant sources of construction-induced groundborne vibrations are pile driving and blasting – neither of which would be involved in the installation or maintenance of structural implementation alternatives. Currently, the state of California has no vibration regulations or guidelines.

7.5.13.3 Potential Impacts

Would the project result in:

Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

The project would have a **potentially significant impact**.

Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels?

The project would have a **potentially significant impact**.

A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

The project would have a **less than significant impact**.

A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

The project would have a **potentially significant impact**.

For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing in or working in the project area to excessive noise levels?

The project would have a **less than significant impact**.

For a project within the vicinity of a private airstrip, would the project expose people residing in or working in the project area to excessive noise levels?

The project would have a **less than significant impact**.

7.5.13.4 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

The monitoring requirements in the Provisions are not expected to cause a significant increase in noise or vibration for the same reasons outlined in Section 7.5.3.3 above. In particular, the staggering of sample collection times—with the Water Boards determining when calendar months begin and end—and the potential to combine sample collection trips for toxicity and individual constituents is expected to further reduce additional vehicle miles traveled and therefore associated noise and vibration from traffic and vehicle use. Furthermore, several dischargers currently use onsite laboratories to determine compliance with toxicity limitations, and it is expected that they would continue to do so to meet the requirements under the Provisions. The impacts of noise and vibration resulting from the implementation of the Provisions are considered less than significant. No mitigation required.

Potential Impacts from Structural Control Construction

Construction activities would not cause a permanent increase in ambient noise levels. All construction activities would be intermittent. The remaining thresholds may be exceeded for limited durations depending on the location and ambient noise levels at sites construction of structural controls (item a, b, and d).

Increases in noise levels during construction would vary depending on the existing ambient levels at each site. Once a site has been selected, project-level analysis to determine noise impacts would involve: (i) identifying sensitive receptors within a quarter-mile vicinity of the site, (ii) characterizing existing ambient noise levels at these sensitive receptors, (iii) determining noise levels of any and all installation equipment, and (iv) adjusting values for distance between noise source and sensitive receptor. In addition, the potential for increased noise levels due to the construction of structural controls is limited and short-term. These short-term noise impacts can be mitigated by implementing commonly-used noise abatement procedures, standard construction techniques such as sound barriers, mufflers and employing restricted hours of operation. Applicable and appropriate mitigation measures could be evaluated when specific projects are determined, depending upon proximity of construction activities to receptors.

Overall, noise levels are governed primarily by the noisiest pieces of equipment. For most construction equipment the engine is the dominant noise source. Typical maximum noise emission levels (Lmax) are summarized, based on construction equipment operating at full power at a reference distance of 50 feet, and an estimated equipment usage factor based on experience with other similar installation projects. The usage factor is a fraction that accounts for the total time during an eight-hour day in which a piece of installation equipment is producing noise under full power. Although the noise levels in Table 7-6 represent typical values, there can be wide fluctuations in the noise emissions of similar equipment based on two important factors: (1) the operating condition of the equipment (e.g., age, presence of mufflers and engine cowlings); and (2) the technique used by the equipment operator (aggressive vs. conservative).

Table 7-6. Typical Installation Equipment Noise Emissions

Equipment	Maximum Noise Level, 50 feet from source (dBA)l	Equipment Usage Factor	Total 8-hr L_{eq} exposure at 50 feet (dBA)	Total 8-hr L_{eq} exposure at 100 feet (dBA)
Foundation Installation			83	77
Concrete Truck	82	0.25	76	70
Front Loader	80	0.	75	69
Dump Truck	71	0.25	65	59
Generator to vibrate concrete	82	0.15	74	68
Vibratory Hammer	86	0.25	80	74
Equipment Installation			83	77
Flatbed Truck	78	0.15	70	64
Forklift	80	0.27	74	69
Large Crane	85	0.5	82	76

Source: Los Angeles Water Board 2007

Contractors and equipment manufacturers have been addressing noise problems for many years, and through design improvements, technological advances, and a better understanding of how to minimize exposures to noise, noise effects can be minimized. An operations plan for the specific construction and/or maintenance activities could be developed to address the variety of available measures to limit the impacts from noise to adjacent homes and businesses. To minimize noise and vibration impacts at nearby sensitive sites, installation activities should be conducted during daytime hours to the extent feasible. There are a number of measures that can be taken to reduce intrusion without placing unreasonable constraints on the installation process or substantially increasing costs. These include noise and vibration monitoring to ensure that contractors take all reasonable steps to minimize impacts when near sensitive areas; noise testing and inspections of equipment to ensure that all equipment on the site is in good condition and effectively muffled; and an active community liaison program. A community liaison program should keep residents informed about installation plans, so they can plan around noise or vibration impacts; it should also provide a conduit for residents to express any concerns or complaints.

The following measures would minimize noise and vibration disturbances at sensitive areas during installation:

- Use newer equipment with improved noise muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All installation equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).
- Perform all installation in a manner to minimize noise and vibration. Use installation methods or equipment that will provide the lowest level of noise and ground vibration impact near residences and consider alternative methods that are also suitable for the soil condition. The contractor should select installation processes and techniques that create the lowest noise levels.
- Perform noise and vibration monitoring to demonstrate compliance with the noise limits. Independent monitoring should be performed to check compliance in particularly sensitive areas. Require contractors to modify and/or reschedule their installation activities if monitoring determines that maximum limits are exceeded at residential land uses.
- Conduct truck loading, unloading and hauling operations so that noise and vibration are kept to a minimum by carefully selecting routes to avoid going through residential neighborhoods to the greatest possible extent. Ingress and egress to and from the staging area should be on collector streets or higher street designations (preferred).
- Turn off idling equipment.
- Temporary noise barriers shall be used and relocated, as practicable, to protect sensitive receptors against excessive noise from installation activities. Consider mitigation measures such as partial enclosures around continuously operating equipment or temporary barriers along installation boundaries.
- The installation contractor should be required by contract specification to comply with all local noise and vibration ordinances and obtain all necessary permits and variances.

These and other measures can be classified into three distinct approaches as outlined in Table 7-7.

Table 7-7. Noise Abatement Measures

Type of Control	Description
Source Control	*Time Constraints* – Prohibiting work during sensitive nighttime hours *Scheduling* – performing noisy work during less sensitive time periods *Equipment Restrictions* – restricting the type of equipment used *Substitute Methods* – using quieter equipment when possible *Exhaust Mufflers* – ensuring equipment have quality mufflers installed *Lubrication and Maintenance* – well maintained equipment is quieter *Reduced Power Operation* – use only necessary power and size *Limit equipment on-site* – only have necessary equipment onsite *Noise Compliance Monitoring* – technician on-site to ensure compliance
Path Control	*Noise barriers* – semi-portable or portable concrete or wooden barriers *Noise curtains* – flexible intervening curtain systems hung from supports *Increased distance* – perform noisy activities further away from receptors
Receptor Control	*Community participation* – Open dialog to involve affected parties *Noise complaint process* – Ability to log and respond to noise complaints

Source: Adapted from Thalheimer 2000

Increases in ambient noise levels are expected to be less than significant once measures have been properly applied to reduce potential impacts.

Potential Impacts from Operation and Maintenance Activities

The Provisions is not a project located within an airport land use plan (item e) or in the vicinity of a private airstrip (item f).

Structural pollution control measures for POTWs and industrial facilities often require the use of noise generating equipment such as pumps and aeration blowers. Backup generators are commonly maintained onsite in case of power failures. Vehicle use required for O/M activities also generates noise. Other types of structural controls (i.e., catchment basins) do not generate any noise.

Operation and maintenance of toxicity controls are not expected to an increase in noise or vibration on temporary and permanent bases (items a, b, c, and d). Noise levels related to O/M activities were determined to not appreciably increase above ambient noise levels for the five projects reviewed by the State Water Board. Generally, noise levels generated from existing equipment were the same as those generated from new equipment. Also, noise generated from operational vehicle trips was determined to be less than significant.

No mitigation was required for potential noise impacts due to O/M activities.

Summary

The installation of structural controls could result in potentially significant environmental effects with regard to noise and vibration. Measures, however, can be applied to reduce and/or eliminate these impacts, as generally described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.14 Populations and Housing

7.5.14.1 Potential Impacts

Would the project:

Induce substantial unplanned population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?

The project would have **no impact**.

Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

The project would have **no impact.**

Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

The project would have **no impact**.

7.5.14.2 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

The Provisions would not affect population and housing in any way (item a, b, and c). The collection and processing of water samples required by the Provisions would not induce population growth, nor displace existing housing or people. It is not reasonably foreseeable that the construction of structural controls would affect population or housing either. Construction activities would occur at or adjacent to existing operations and it is highly unlikely any existing housing would be affected. No mitigation required. For additional information, see “Growth- Inducing Impacts” in Section 7.7.

Compliance with the Provisions is anticipated to have no impact on population and housing.

7.5.15 Public Services

7.5.15.1 Potential Impacts

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Fire protection?

The project would have a **potentially significant impact**.

Police protection?

The project would have a **potentially significant impact**.

Schools?

The project would have **no impact**.

Parks?

The project would have **no impact**.

Other public facilities?

The project would have **no impact**.

7.5.15.2 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

The monitoring requirements in the Provisions are not expected to result in a need for new or altered fire or police protection services, or schools, parks, and other facilities (item a, b, c, d, and e). No mitigation required.

Potential Impacts from Structural Control Construction

Response times for fire and police protection may be temporarily affected during the installation of structural controls (item a and b). There is potential for temporary delays in response times of fire and police vehicles due to road closure/traffic congestion during construction. To mitigate potential delays, the responsible agencies could notify local emergency and police service providers of construction activities and road closures, if any, and coordinate with the local fire and police providers to establish alternative routes and traffic control during the installation activities. Most jurisdictions have in place established procedures to ensure safe passage of emergency and police vehicles during periods of road maintenance, construction, or other attention to physical infrastructure, and there is no evidence to suggest that installation of these structural controls would create any more significant impediments than other such typical activities. Any construction activity would be subject to applicable building and safety codes and permits. Therefore, the potential delays in response times for fire and police vehicles after mitigation are less then significant.

Potential Impacts from Operation and Maintenance Activities

The Provisions would not require the establishment of new or altered governmental facilities to provide the services outlined above. Structural controls that may need to be installed to control for toxicity are not expected to be in the vicinity of or affect the objectives for schools, parks, or other public facilities (item c, d, and e). Since the installation of structural controls would not result in development of land uses for residential, commercial, and/or industrial uses nor would these structural controls result in an increase of growth, it is reasonably foreseeable that the structural controls would not result in a need for new or altered fire or police protection services, or schools, parks, and other facilities (item a, b, c, d, and e). No mitigation required.

Summary

The installation of structural controls could result in potentially significant environmental effects with regard to fire and police response times. Measures, however, can be applied to reduce and/or eliminate these impacts, as generally described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.16 Recreation

7.5.16.1 Potential Impacts

Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

The project would have **no impact**.

Would the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

The project would have **no impact**.

7.5.16.2 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

The Provisions would not increase the use of parks or other recreational facilities, nor would it require their expansion in any way (item a and b). It is not reasonably foreseeable that the installation of structural controls will lead to an increase in the use of existing parks, nor lead to the construction or expansion of recreational facilities. No mitigation required.

Compliance with the Provisions is anticipated to have no impact on recreation.

7.5.17 Transportation and Traffic

7.5.17.1 Potential Impacts

Would the project:

Exceed the capacity of the existing circulation system, based on an applicable measure of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

The project would have a **potentially significant impact**.

Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

The project would have a **less than significant impact**.

Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

The project would have **no impact**.

Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The project would have **no impact**.

Result in inadequate emergency access?

The project would have a **potentially significant impact**.

Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?

The project would have **no impact**.

Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

The project would have a **potentially significant impact**.

7.5.17.2 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts of Monitoring

Monitoring is not expected to cause a significant increase in traffic for the same reasons outlined in Section 7.5.3 above. The impacts on transportation or traffic resulting from the implementation of the Provisions are considered less than significant (item a-g). No mitigation required.

Potential Impacts from Structural Control Construction

Installation of structural controls would not result in a change in air traffic patterns or substantially increase hazards due to design features or incompatible uses, or conflict with adopted policies, plans, or programs supporting alternative transportation (item c, d, and f).

Any increase in vehicular movement due to construction is expected to be temporary and not have a significant impact due to a conflict with an applicable congestion management program (item b).

The installation of structural controls may result in additional vehicular movement or changes in the circulation systems and emergency access during construction (item a and e). These impacts would be temporary and limited in duration to the period of installation.

To the extent that site-specific projects entail excavation in roadways, such excavations should be marked, barricaded, and traffic flow controlled with signals or traffic control personnel in compliance with authorized local police or California Highway Patrol requirements. These methods would be selected and implemented by responsible local agencies considering project level concerns. Standard safety measures should be employed including fencing, other physical safety structures, signage, and other physical impediments designed to promote safety and minimize pedestrian/bicyclists accidents, as well as to provide emergency access.

In order to reduce the impact of construction traffic (item a and g), implementation of a construction traffic management plan for specified facilities could be developed to minimize traffic impacts upon the local circulation system. A construction traffic management plan could address traffic control for any street closure, detour, or other disruption to traffic circulation. The plan could identify the routes that construction vehicles would use to access the site, hours of construction traffic, and traffic controls and detours. The plan could also include plans for temporary traffic control, temporary signage, location points for ingress and egress of construction vehicles, staging areas, and timing of construction activity which appropriately limits hours during which large construction equipment may be brought on or off site. Potential impacts could also be reduced by limiting or restricting hours of construction so as to avoid peak traffic times and by providing temporary traffic signals and flagging to facilitate traffic movement. It is anticipated that impacts after mitigation would be less than significant.

Potential Impacts from Operation and Maintenance Activities

O/M activities that could potentially impact traffic are usually associated with treatment facilities that require delivery and disposal of material used or generated from many of the treatments identified in Chapter 6. (e.g., chemicals, biosolids, etc.). The analyses included in the five environmental documents reviewed by the State Water Board for O/M activity impacts on traffic all determined that potential impacts would be less than significant. No mitigation was required for any of the projects.

Operation and maintenance of a toxicity control is not expected to create a change to existing transportation and traffic, and therefore associated impacts are less than significant (items a-g). No mitigation is required.

Summary

The installation of structural controls could result in potentially significant environmental effects with regard to transportation/traffic. Measures, however, can be applied to reduce and/or eliminate these impacts, as generally described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.18 Tribal and Cultural Resources

AB 52 (Gatto 2014) established a new category of resources in CEQA called Tribal Cultural Resources:

"'Tribal cultural resources' are either of the following: (1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following: (A) Included or determined to be eligible for inclusion in the California Register of Historical Resources. (B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1. (2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe." (Pub. Resources Code, § 21074)

AB 52 also established a consultation process with all California tribes on the Native American Heritage Commission List. Consultation with a California Native American tribe that has requested such consultation may assist a lead agency in determining whether the project may adversely affect tribal cultural resources, and if so, how such effects may be avoided or mitigated. AB 52 requires formal notice to California tribes of an opportunity to consult with the lead agency prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report if the tribe is traditionally and culturally affiliated with the geographic area of the proposed project.

The requirements to consider tribal cultural resources and to consult with California tribes apply to CEQA projects for which the lead agency issues a notice of preparation or a notice of intent to adopt a negative declaration or mitigated negative declaration on or after July 1, 2015. The State Water Board considers AB 52's requirements as also applying to SED.

Letters were sent via certified mail to 14 Tribes in February and March 2016, including all of the California tribes who, at the time, requested to receive AB 52 notices. All delivery receipts were received by the State Water Board by April 13, 2016. Formal consultation was requested by four tribes, the Wilton Rancheria, Ohlone/Costanoan-Esselen Nation, Wiyot Tribe, and the United Auburn Indian Community. State Water Board staff subsequently met with representatives from the tribes in separate meetings during September and October of 2016, to provide an overview of the Provisions, answer any questions, and provide an opportunity for input. None of the tribes requested any changes to the Provisions. Although the formal consultation with each of the tribes has concluded, the tribes were informed that they may continue to provide input on the project through the public participation process.

7.5.18.1 Potential Impacts

Would the project:

Cause a substantial adverse change in the significance of a tribal resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or

The project would have a **potentially significant impact**.

A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

The project would have a **potentially significant impact**.

Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts of Monitoring

Monitoring is not expected to cause an impact on tribal cultural resources. No mitigation is required.

Potential Impacts from Structural Control Construction

If a discharger chooses to implement a structural control, this construction could include earth disturbing activities. The construction related activities would mostly occur in currently developed areas where ground disturbance has previously occurred. Because these areas are already developed it is unlikely that construction activities would cause a substantial adverse change to tribal cultural resources. Depending, however, on the location of facilities, potential impacts to tribal cultural resources could occur. The site-specific presence or absence of these resources is unknown because the specific locations for compliance methods would be determined by local agencies, in consultation with the Tribes, at the project level. Installation of these systems could result in minor ground disturbances, which could impact tribal cultural resources if they are sited in locations containing these resources and where disturbances have not previously occurred. If feasible, the location of the construction shall be chosen as to avoid the disturbance of known tribal cultural resources. As an already constructed and highly disturbed site, any associated soil movement and disturbance within the existing footprint of a facility is unlikely to create a significant impact to tribal cultural resources in comparison to existing baseline conditions.

In the event that excavation activities or earth disturbing activities take place in previously undisturbed areas, a cultural resources investigation shall be required prior to any substantial disturbance. The cultural resources investigation will include, at a minimum, a record search for previously identified cultural resources and previously conducted cultural resources investigations of the project parcel and vicinity. This record search should include, at a minimum, contacting the appropriate information center, such as the information centers of the California Historical Resources Information System. In coordination with the information center or a qualified archaeologist, or in coordination with tribes culturally affiliated with the geographic area of the site, a determination regarding whether previously identified cultural resources will be affected by the proposed activity must be made and if previously conducted investigations were performed. The purpose of this investigation would be to identify resources before they are affected and avoid or mitigate any significant impact.

None of the facility upgrade projects reviewed identified any direct impacts to cultural resources. However, there is always the potential that tribal cultural resources will be encountered during earth disturbing activities. Depending on the nature of the facility, footprint, and operational activities, the potential for impacts will vary. Inclusion of the following mitigation measures should reduce potential impacts to less than significant:

- A cultural resources investigation should be conducted before any substantial disturbance. The cultural resources investigation will include, at a minimum, a record search for previously identified cultural resources, including sites, features, places, cultural landscapes, sacred places, and objects with cultural value.

- The lead agency of the project specific CEQA analysis will consider the impact of the project on tribal cultural resources and follow consultation requirements pursuant to Public Resources Code sections 21080.3.1, 21080.3.2, and 21082.3.
- Accidental Discovery - If tribal cultural resources are inadvertently discovered during ground disturbing activities, no further construction will be permitted within 100 feet of the find until a qualified archaeologist or Tribal representative can assess the significance of the find and prepare an avoidance, evaluation, or recovery plan. Such a plan may involve resource avoidance or could include recovery and archival research.
- Discovery of Human Remains - In the event that human remains are encountered during construction activities, the project proponent shall comply with Section 15064.5 (e) (1) of the CEQA Guidelines and PRC Section 7050.5. All project-related ground disturbance in the vicinity of the human remains shall be halted until the county coroner has been notified. If the coroner determines that the remains are Native American, the coroner will notify the Native American Heritage Commission (NAHC) to identify the most likely descendants of the deceased Native Americans. Project-related ground disturbance in the vicinity of the find shall not resume until the process detailed in Section 15064.5 (e) has been completed.
- Upon discovery of human remains during construction, California law protects Native American burials, skeletal remains, and associated grave goods regardless of the antiquity and provides for the sensitive treatment and disposition of those remains. (Health & Safety Code, Section 7050.5; Public Resource Code, Section 5097.9 et seq).

Potential Impacts from Operation and Maintenance Activities

Operation and maintenance activities (O/M) from the installation of toxicity controls would not result in an impact to tribal cultural resources. O/M may occur inside buildings, or within previously developed areas. In addition, O/M would not be expected to lead to ground disturbing activities, beyond existing conditions. Therefore, no impact is expected.

Summary

The construction of structural controls could result in potentially significant environmental effects with regard to tribal cultural resources. Measures, however, can be applied to reduce and/or eliminate these impacts, as generally described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.19 Utilities and Service Systems

7.5.19.1 Potential Impacts

Would the project:

Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

The project would have **no impact**.

Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts?

The project would have a **potentially significant impact**.

Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts?

The project would have a **potentially significant impact**.

Have sufficient water supplies available to serve the project from existing entitlements and resources, and reasonably foreseeable future development during normal, dry and multiple dry years?

The project would have **no impact**.

Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

The project would have a **less than significant impact**.

Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

The project would have a **less than significant impact**.

Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

The project would have **no impact**.

Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

The project would have **no impact**.

7.5.19.2 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

The implementation of the Provisions would not result in the development of any large residential, retail, industrial or any other development projects that would significantly increase the demand on the storm water infrastructure (item c) or require new water supply facilities (item d) or result in a change in demand for wastewater treatments (item e). Implementation of the Provisions would not result in the need for new, nor alterations of existing sewer or septic tank systems (item e). Likewise, the Provisions are not expected to exceed wastewater treatment requirements and are consistent with regulated related to solid waste (items f, g, and h).

Potential Impacts from Monitoring

The monitoring requirements in the Provision will not have an adverse effect on utilities and service systems.

To assess the potential laboratory impacts (disposal of test water and test species) expected to occur on a routine basis from the Provisions, and the possible impact on landfills or wastewater treatment, existing monitoring requirements of the sample set of dischargers were compared to those monitoring requirements expected to result from the Provisions. Estimates of the foreseeable changes between the two were made using two monitoring parameters: number of toxicity tests and number of test chambers required.

The number of test chambers used for a given toxicity test in the sample includes replicates for five concentrations and a control, reflects the minimum required by the methods identified in Code of Federal Regulations, title 40, section 136.3, and serves as a measure of laboratory resources and waste (e.g., test species, food, water).The Provisions do not contain changes to the laboratory test methods. Therefore, this analysis assumes that the test methods and all laboratory procedures will remain unchanged.

Initially, toxicity testing and monitoring requirements in the sample facilities' permits before October 2018 were used as the baseline for determining impacts of the proposed toxicity provisions. These values were compared to possible requirements under the October 19, 2018 Draft Provisions. Reasonable potential and most sensitive species screening calculations used in this analysis were carried out by Abt Associates Inc. using data obtained between 2006 and 2008. Acute and chronic test species were evaluated for all dischargers. However, test species were not defined for all dischargers due to a lack of available data. Reductions in laboratory impacts were labeled “no impact,” as were situations where no change in these parameters was expected.

Table 7-8 provides the results of the analysis. Eight of the 13 dischargers were expected to have possible laboratory impacts, while the remaining five dischargers were expected to have no laboratory impacts.

Table 7-8. Estimated Changes in Laboratory Monitoring Impacts

Discharger	Baseline Requirements for Acute Toxicity	Baseline Requirements for Chronic Toxicity	Provisions for Acute Toxicity	Provisions for Chronic Toxicity	Laboratory Impacts
Royal Mountain King Mine	Annual tests using *O. mykiss*	Annual tests using *C. dubia,* *P. promelas* *S. capricornutum*	No acute toxicity monitoring	Four tests using *S. capricornutum*	Decrease in laboratory resources and laboratory waste
Royal Mountain King Mine	Annual Totals: 4 toxicity tests 3 sampling trips 112 test chambers	Annual Totals: 4 toxicity tests 3 sampling trips 112 test chambers	Annual Totals: 4 toxicity tests 4 sampling trips 96 test chambers	Annual Totals: 4 toxicity tests 4 sampling trips 96 test chambers	No Impact
Chevron, Richmond Refinery	Weekly flow-through tests using *O. mykiss*	Quarterly tests using *C. dubia*	Weekly flow-through tests using *O. mykiss*	Monthly tests (species not defined)	Possible increase in laboratory resources and laboratory waste, depending upon species

Discharger	Baseline Requirements for Acute Toxicity	Baseline Requirements for Chronic Toxicity	Provisions for Acute Toxicity	Provisions for Chronic Toxicity	Laboratory Impacts
Chevron Richmond Refinery	<u>Annual Totals:</u> 56 toxicity tests 12 sampling trips 448 test chambers	<u>Annual Totals:</u> 56 toxicity tests 12 sampling trips 448 test chambers	<u>Annual Totals:</u> 64 toxicity tests 12 to 36 sampling trips 424 to 928 test chambers* *Dependent upon species	<u>Annual Totals:</u> 64 toxicity tests 12 to 36 sampling trips 424 to 928 test chambers* *Dependent upon species	Possible impact
City of Davis WWTP	Monthly tests using *O. mykiss* (at two outfalls, if those outfalls discharge)	Quarterly tests using *C. dubia* *P. promelas* *S. capricornutum* (at two outfalls, if those outfalls discharge)	No acute toxicity monitoring	Monthly tests using *S. capricornutum*	Decrease in laboratory resources and laboratory waste
City of Davis WWTP	<u>Annual Totals:</u> 24 toxicity tests 20 sampling trips 960 test chambers (Assuming discharge at both outfalls)	<u>Annual Totals:</u> 24 toxicity tests 20 sampling trips 960 test chambers (Assuming discharge at both outfalls)	<u>Annual Totals:</u> 12 toxicity tests 12 sampling trips 576 test chambers (Assuming discharge at both outfalls)	<u>Annual Totals:</u> 12 toxicity tests 12 sampling trips 576 test chambers (Assuming discharge at both outfalls)	No impact

Discharger	Baseline Requirements for Acute Toxicity	Baseline Requirements for Chronic Toxicity	Provisions for Acute Toxicity	Provisions for Chronic Toxicity	Laboratory Impacts
Colton/San Bernardino Regional Tertiary Treatment Facility	No acute toxicity monitoring	Monthly tests using *C. dubia*	No acute toxicity monitoring	Monthly tests (species not defined)	Possible decrease in laboratory resources and laboratory waste, depending upon species
Colton/San Bernardino Regional Tertiary Treatment Facility	<u>Annual Totals:</u> 12 toxicity tests 36 sampling trips 720 test chambers	<u>Annual Totals:</u> 12 toxicity tests 36 sampling trips 720 test chambers	<u>Annual Totals:</u> 12 toxicity tests 12 to 36 sampling trips 216 to 720 test chambers* *Dependent upon species	<u>Annual Totals:</u> 12 toxicity tests 12 to 36 sampling trips 216 to 720 test chambers* *Dependent upon species	No impact
DWR, Warne Power Plant	No acute toxicity monitoring	Annual tests using *C. dubia* *P. promelas* *S. capricornutum* (at two outfalls)	No acute toxicity monitoring	Four tests per year (species not defined; assumes two outfalls)	Possible increase in laboratory resources and laboratory waste, depending upon species

Discharger	Baseline Requirements for Acute Toxicity	Baseline Requirements for Chronic Toxicity	Provisions for Acute Toxicity	Provisions for Chronic Toxicity	Laboratory Impacts
DWR, Warne Power Plant	Annual Totals: 6 toxicity tests 3 sampling trips 216 test chambers	Annual Totals: 6 toxicity tests 3 sampling trips 216 test chambers	Annual Totals : 8 toxicity tests 4 to 12 sampling trips 144 to 480 test chambers* *Dependent upon species	Annual Totals : 8 toxicity tests 4 to 12 sampling trips 144 to 480 test chambers* *Dependent upon species	Possible impact
LACSD San Jose Creek WRP	No acute toxicity monitoring	Monthly tests, species varies; at 2 outfalls, with 3 species sensitivity screenings every 2 years	No acute toxicity monitoring	Monthly, at 2 outfalls, with *C. dubia*	Possible increase in laboratory resources and laboratory waste, depending upon species
LACSD San Jose Creek WRP	Annual Totals (Typical Year): 24 toxicity tests 36 sampling trips 432 to 1,440 test chambers*	Annual Totals (Typical Year): 24 toxicity tests 36 sampling trips 432 to 1,440 test chambers*	Annual Totals: 24 toxicity tests 36 sampling trips 1,440 test chambers	Annual Totals: 24 toxicity tests 36 sampling trips 1,440 test chambers	Possible impact

Discharger	Baseline Requirements for Acute Toxicity	Baseline Requirements for Chronic Toxicity	Provisions for Acute Toxicity	Provisions for Chronic Toxicity	Laboratory Impacts
Lompoc Regional WWTP	Monthly tests using *P. promelas*	Quarterly tests using *S. capricornutum*; 2 additional species for 1st quarter	No acute toxicity monitoring	Monthly tests using *S. capricornutum*	Possible increase in laboratory resources and laboratory waste, depending upon species
Lompoc Regional WWTP	Annual Totals (Typical Year): 18 toxicity tests 12 sampling trips 192 test chambers	Annual Totals (Typical Year): 18 toxicity tests 12 sampling trips 192 test chambers	Annual Totals: 12 toxicity tests 12 sampling trips 288 test chambers	Annual Totals: 12 toxicity tests 12 sampling trips 288 test chambers	Possible impact
Pactiv Corporation, Molded Pulp Mill *	Quarterly tests using *O. mykiss*	Once per permit term tests using *C. dubia* *P. promelas* *S. capricornutum*	No acute toxicity monitoring	Monthly tests using *C. dubia*	Increase in laboratory resources and laboratory waste
Pactiv Corporation, Molded Pulp Mill *	Annual Totals (Typical Year): 4 toxicity tests 4 sampling trips 16 test chambers	Annual Totals (Typical Year): 4 toxicity tests 4 sampling trips 16 test chambers	Annual Totals: 12 toxicity tests 36 sampling trips 720 test chambers	Annual Totals: 12 toxicity tests 36 sampling trips 720 test chambers	Possible impact

Discharger	Baseline Requirements for Acute Toxicity	Baseline Requirements for Chronic Toxicity	Provisions for Acute Toxicity	Provisions for Chronic Toxicity	Laboratory Impacts
Sacramento Regional WWTP	Weekly flow-through tests using *O. mykiss*	Monthly tests using *C. dubia* *P. promelas* *S. capricornutum* at three locations (effluent, upstream RW, downstream RW)	Weekly flow-through tests using O. mykiss	Monthly tests using *C. dubia*	Decrease in laboratory resources and laboratory waste
Sacramento Regional WWTP	Annual Totals: 88 toxicity tests 0 sampling trips 1,504 test chambers	Annual Totals: 88 toxicity tests 0 sampling trips 1,504 test chambers	Annual Total: 64 toxicity tests 0 sampling trips 928 test chambers	Annual Total: 64 toxicity tests 0 sampling trips 928 test chambers	No impact
Shell Oil, Martinez Refinery	Weekly flow-through tests using *O. mykiss*	Quarterly tests using *A. bahia*	Weekly flow-through tests using *O. mykiss*	Quarterly tests using *A. bahia*	No change in laboratory resources or laboratory waste
Shell Oil, Martinez Refinery	Annual Totals: 56 toxicity tests 12 sampling trips 400 test chambers	Annual Totals: 56 toxicity tests 12 sampling trips 400 test chambers	Annual Totals: 56 toxicity tests 12 sampling trips 400 test chambers	Annual Totals: 56 toxicity tests 12 sampling trips 400 test chambers	No impact

Discharger	Baseline Requirements for Acute Toxicity	Baseline Requirements for Chronic Toxicity	Provisions for Acute Toxicity	Provisions for Chronic Toxicity	Laboratory Impacts
USS-POSCO Industries	Biweekly flow-through tests using *O. mykiss*	Quarterly tests using *H. rufescens*	Biweekly flow-through tests using *O. mykiss*	Monthly tests using *H. rufescens*	Increase in laboratory resources and laboratory waste
USS-POSCO Industries	Annual Totals: 30 toxicity tests 4 sampling trips 224 test chambers	Annual Totals: 30 toxicity tests 4 sampling trips 224 test chambers	Annual Totals: 38 toxicity tests 12 sampling trips 464 test chambers	Annual Totals: 38 toxicity tests 12 sampling trips 464 test chambers	Possible impact
Victor Valley Regional WWTP	Quarterly tests using *P. promelas*	Annual using *C. dubia* *P. promelas*	No acute toxicity monitoring	Monthly tests (species not defined)	Increase in laboratory resources and laboratory waste
Victor Valley Regional WWTP	Annual Totals: 6 toxicity tests 6 sampling trips 116 test chambers	Annual Totals: 6 toxicity tests 6 sampling trips 116 test chambers	Annual Totals: 12 toxicity tests 12 to 36 sampling trips 216 to 720 test chambers* *Dependent upon species	Annual Totals: 12 toxicity tests 12 to 36 sampling trips 216 to 720 test chambers* *Dependent upon species	Possible impact

Discharger	Baseline Requirements for Acute Toxicity	Baseline Requirements for Chronic Toxicity	Provisions for Acute Toxicity	Provisions for Chronic Toxicity	Laboratory Impacts
Forestville	Monthly tests using *O. mykiss*	Annual tests using *P. promelas, C. dubia, S. capricornutum.* After SSS, may be reduced to single species	No acute toxicity monitoring	Four tests per year (species not defined)	Possible increase in laboratory resources and laboratory waste, depending upon species
Forestville	<u>Annual Totals</u> 15 toxicity tests 18 sampling trips 156 test chambers	<u>Annual Totals</u> 15 toxicity tests 18 sampling trips 156 test chambers	<u>Annual Totals :</u> 4 toxicity tests 4 to 12 sampling trips 96 to 240 test chambers* *Dependent upon species	<u>Annual Totals :</u> 4 toxicity tests 4 to 12 sampling trips 96 to 240 test chambers* *Dependent upon species	Possible impact

* The owner of this facility changed in 2019 and the facility name changed to "Reynolds Molded Pulp Mill". See Central Valley Water Quality Control Board Order No. R5-2019-0075, Change of Name and/or Ownership of Facilities Having Waste Discharge Requirements.

The facilities and impacts were reevaluated based the requirements of the July 7, 2020 Second Revised Draft Provisions. Monitoring requirements from updated permits (current as of June 2020) for the facilities in Table 7-9. For this analysis, it was assumed that there would be no change to existing acute toxicity monitoring. It was also assumed that all freshwater dischargers would be required to use a ten-replicate chronic test (e.g., as for *C. dubia*) and all estuarine dischargers would be required to use a five-replicate chronic test (e.g., red abalone). The new summary of changes is shown in Table 7-9.

Table 7-9. Revised Changes in Laboratory Monitoring Impacts

Facility	Change in Laboratory Resources/Waste
Royal Mountain King Mine	Increase
Chevron, Richmond Refinery	No change
City of Davis WWTP	Increase
Colton/San Bernardino Regional	No change
DWR, Warne Power Plant	Increase
LACSD San Jose Creek WRP	No change
Lompoc Regional WWTP	Increase
Pactiv Molded Pulp Mill [i]	Increase
Sacramento Regional WWTP	Decrease
Shell Oil, Martinez Refinery	Increase
USS-POSCO Industries	Increase
Victor Valley Regional WWTP	Increase
Forestville CSD	Increase

After re-evaluation, nine facilities are expected to have an increase in laboratory resources and waste. Four facilities were expected to have no change or a decrease in existing laboratory resource use. There were significant changes in impacts for six facilities. The Royal Mountain King Mine, City of Davis WWTP, and Shell Oil Martinez Refinery facilities are now expected to increase use of laboratory resources and waste and have possible impacts. The Chevron Richmond Refinery facility changed from a “possible increase” to an increase due to the assumption that the facility would use a ten-replicate test. The LACSD San Jose Creek WRP changed from an “increase” to “no change” each monitoring period under the assumption that the facility would no longer be required to use three test species. The Sacramento Regional WWTP changed from an “increase” to a “decrease” for the same assumption.

Based upon the representative sample used in the original and new analyses, compliance with the Provisions is anticipated to lead to a slight increase in laboratory waste and resource use in comparison to baseline conditions for most dischargers. Although the amount of waste and resource use may increase for a given discharger, the impacts from the facilities that could see an increase in toxicity tests are expected to be less than significant. This is because the quantity of laboratory water, test species, and test species food required for single-concentration tests is minimal overall. For example, the Lompoc Regional WWTP could experience an increase from quarterly to monthly chronic toxicity testing, which would be an increase of eight chronic toxicity tests per year. This may, depending upon the most sensitive test species, result in an increase of up to 480 additional test chambers per year (e.g., ten test chambers for each concentration for a *C. dubia* chronic test). However, although many more test chambers would be used, the increase in the number of test chambers represents a very small amount of laboratory resources and waste.

Although the number of chronic toxicity tests from the discharger's current condition may increase, the amount of test water collected from the discharge facility per year and the amount of laboratory water necessary for the controls for each individual test would be minimal. The U.S. EPA chronic toxicity test manuals recommend about five liters of test water be collected for each chronic toxicity test and the amount of control water needed for each test is substantially less (U.S. EPA 2002b). A facility that is required to conduct monthly chronic toxicity testing would collect about 60 liters (around 16 gallons) of test water per year. The laboratory would also need to use less than one gallon of control water per year to conduct monthly chronic toxicity testing for an individual discharge facility.

Discharger-specific increases in the amount of test species and test species food would also be less than significant. A mere 10.5 grams of *Artemia nauplii* (brine shrimp larvae) is all that is required to feed four replicates and their control for a seven-day *P. promelas* larval survival and growth test. This equates to 126 grams or 4.4 ounces for a year's worth of monthly testing under the Provisions. The *C. dubia* method requires even less food, as 12 survival and reproduction tests would necessitate 92.4 milliliters or 0.02 gallons of yeast-cerophyl-trout chow and algal suspension, while *S. capricornutum* does not require any food at all. Test species quantities are expected to increase only for those dischargers that currently conduct annual, biannual or quarterly tests, as well as those that are not required to monitor toxicity at all. As current methodology requires the use of five sample concentrations, quarterly testing regimes utilizing *P. promelas*, for example, necessitate a total of 840 fish.

No special disposal is required for water or test organisms from non-toxic samples or for the controls. These samples are simply poured down the drain. For samples that test positive for a specific pollutant or toxicity of unknown origin, the samples are poured into the appropriate evaporation drum. The amount of precipitate left behind is so minute that it will take decades for any appreciable amount of material to accumulate in the drums (pers. comm., AquaScience).

Therefore, any increase in the amount of sampling required due to the Provisions will not cause any significant increase in the amount of waste material produced from the test methods employed. No mitigation required.

The small amount of waste resulting from the testing of water samples will have a less than significant impact on wastewater treatment facilities and landfill facilities (items b, f, g, and h). No mitigation required.

Potential Impacts from Structural Control Construction

It is not expected that the provisions would result in the construction of new storm water drainage facilities or new wastewater treatment systems. However, toxicity controls that include expansion of the existing footprint, such as construction of a settling pond, could lead to expansion of existing facilities (item b and c). Construction of toxicity controls are discussed further in each of the category impacts of this Chapter and could have a potentially significant impact.

Construction of toxicity controls should be of a short duration and should have minimal impacts, and as they are in the vicinity of an existing facility and systems, any construction is expected to be served by a landfill with sufficient capacity to accommodate any associated construction waste (item f).

Potential Impacts from Operation and Maintenance Activities

The installation of structural controls and O/M activities will not adversely affect utilities and service systems. The operations and maintenance of structural controls for non-storm water NPDES dischargers is expected to occur within existing facilities, and not lead to an increase in wastewater volume. The Provisions are not anticipated to require structural control construction measures for storm water dischargers, for nonpoint source dischargers, or for other non-NPDES dischargers. Some structural controls, such as diverting runoff away from surface waters and maintaining adequate riparian buffer strips are structural controls that could possibly have an impact on stormwater systems. However, because dischargers are not anticipated to implement these controls a result of the Provisions they do not change the conclusion that the Provisions will have a less than significant impact on utilities and service systems (items b, c, and e).

Summary

The construction of structural controls could result in potentially significant environmental effects with regard to utilities and service systems. However, measures can be applied to reduce and/or eliminate these impacts, as described above. These measures are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be significant.

7.5.20 Wildfire

Wildfires can have a devastating and lasting effect on forest and nearby communities.

Wildfires also have a lasting negative effect on air and water quality over an area that extends far beyond burned areas. State and local plans exist to prevent wildfires and to combat wildfires when they occur. Plans also exist for clean-up after a wildfire to mitigate effects on impacted communities and the environment.

7.5.20.1 Regulatory Background

State

2018 Strategic Fire Plan for California

The Strategic Fire Plan (CAL FIRE 2018) provides direction and guidance to CAL FIRE and its 21 field units. The 2018 Plan sets forth a number of goals focused on fire prevention, natural resource management, and fire suppression efforts, which are summarized here:

a. Improve the availability and use of consistent, shared information on hazard and risk assessment;

b. Promote the role of local planning processes, including general plans, new development, and existing developments, and recognize individual landowner/homeowner responsibilities;

c. Foster a shared vision among communities and the multiple fire protection jurisdictions, including county-based plans and community-based plans such as Community Wildfire Protection Plans;

d. Increase awareness and actions to improve fire resistance of man-made assets at risk and fire resilience of wildland environments through natural resource management;

e. Integrate implementation of fire and vegetative fuels management practices consistent with the priorities of landowners or managers;

f. Determine and seek the needed level of resources for fire prevention, natural resource management, fire suppression, and related services; and

g. Implement needed assessments and actions for post-fire protection and recovery.

California Public Resources Code

The Public Resources Code (PRC) includes fire safety regulations restricting the use of certain equipment that could produce sparks or flames, and specifies requirements for the safe use of gasoline-powered tools in fire hazard areas

Local

Numerous local jurisdictions (i.e., cities and counties) are located throughout California. Most, if not all, of these jurisdictions have adopted general plans that identify goals and policies related to public safety and hazards, such as exposure to wildfires.

7.5.20.2 Potential Impacts

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

Substantially impair an adopted emergency response plan or emergency evacuation plan?

The project would have **no impact**.

Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

The project would have **no impact**.

Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

The project would have **no impact**.

Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The project would have **no impact**.

7.5.20.3 Impacts and Mitigation

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

Potential Impacts from Monitoring

Monitoring is not expected to cause an impact on wildfire.

Potential Impacts from Structural Control Construction

If a discharger chooses to implement a structural control, construction could include earth disturbing activities. The construction-related activities would mostly occur in currently developed areas where ground disturbance has previously occurred. Because these areas are already developed it is unlikely that construction activities would cause a substantial adverse change to emergency response plans in the case of a wildfire. Construction of structural controls would need to be carried out in accordance with local emergency response plans, especially in areas that may be subject to potential wildfires. It is also unlikely that any such construction activities could lead to any additional risk from wildfire. No impact is expected.

Potential Impacts from Operation and Maintenance Activities

Operation and maintenance activities (O/M) from the installation of toxicity controls would not result in an impact to wildfire. Operation and maintenance activities would likely use existing roads and power sources. Therefore, no impact is expected.

Summary

The proposed project is not expected to have a significant impact on wildfire or wildfire response in California.

7.5.21 Mandatory Findings of Significance

Issues (and Supporting Information Sources):

a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

   The project has a **potentially significant impact**.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)

   The project has a **potentially significant impact**.

c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

   The project has a **potentially significant impact**.

Some of the potential impacts discussed in this section relate to the construction and operation and maintenance of possible new or upgraded toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely.

a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

As discussed further in this Chapter, activities associated with monitoring (sampling trips, sample testing, and sample disposal) will either have a less than significant effect on the environment or have no impact. The construction of toxicity controls could potentially have significant environmental effects with respect to Air Quality, Agricultural and Forest Resources, Biological Resources, Cultural Resources, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Noise and Vibration, Public Services, and Transportation/Traffic, Tribal Cultural Resources, and Utilities and Service Systems. However, measures can be applied to reduce and/or eliminate these impacts. As discussed in the previous sections, O/M activities could potentially have significant environmental effects with respect to Greenhouse Gas Emissions. Measures, however, can be applied to reduce and/or eliminate these impacts. Therefore, it is not expected that the construction and operation and maintenance of toxicity controls will degrade the quality of the environment, reduce habitat, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number of rare or endangered species, or eliminate important examples of California history or prehistory. However, measures to reduce or eliminate impacts are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Therefore, these impacts could be potentially significant.

b) Does the project have impacts that are individually limited, but cumulatively considerable?

The analysis on cumulative impacts is included in Section 7.7 of this Staff Report.

c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

Activities associated with monitoring (sampling trips, sample testing, and sample disposal) are not expected to cause substantial adverse effects on human beings, either directly or indirectly. The construction of toxicity controls could potentially have significant environmental effects with respect to Air Quality, Biological Resources, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Noise and Vibration, Public Services, and Transportation/Traffic, that may impact human beings, either directly or indirectly. However, measures can be applied to reduce and/or eliminate these impacts. As discussed in the previous sections, O/M activities could potentially have significant environmental effects with respect to Greenhouse Gas Emissions. Measures, however, can be applied to reduce and/or eliminate these impacts. Therefore, it is not expected that the construction and operation and maintenance of toxicity controls will cause a substantial adverse impact on human beings.

However, measures to reduce or eliminate impacts are within the responsibility and jurisdiction of the agencies approving or carrying out the individual projects and can or should be adopted by them. The State Water Board does not direct which compliance measures are chosen nor the mitigation measures employed. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts.

Therefore, there could be environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.

7.6 Growth-Inducing Impacts

This section describes the potential for the Provisions to cause environmental impacts through the inducement of growth, in compliance with the requirements of the CEQA Guidelines (Cal. Code of Reg., tit. 14, § 15126(d)) and CEQA (Pub. Resources Code, § 21100 (b)(5)). Growth inducement occurs when projects affect the timing or location of either population or land use growth or create a surplus in infrastructure capacity.

Defined under section 15126.2, subdivision (d) of the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15000 et seq.), growth-inducing impacts are either direct or indirect conditions that could foster economic development, an increase in population size, or the construction of housing in the surrounding environment.

This analysis is organized into the primary types of growth that occur: (1) development of land, (2) population growth, and (3) the removal of existing obstacles to growth. The first two types of grown can occur either directly or indirectly, as described later, while the removal of existing obstacles to growth is an indirect impact. Economic growth, such as the creation of additional job opportunities, also could occur; however, such growth generally would lead to population growth and, therefore, is included indirectly in population growth.

7.6.1 Growth in Land Development

Growth in land development considered in this analysis is the possible physical development of residential, commercial, and industrial structures in and around where implementation of the Provisions and reasonably foreseeable methods of compliance may be located. Land use growth is subject to general plans, community plans, parcel zoning, and applicable entitlements and is dependent on adequate infrastructure to support development. Direct growth in land development occurs when, for example, a project accommodates populations in excess of those projected by local or regional planning agencies. The Provisions would not result in the construction of new housing, commercial facilities, or industries. The Provisions would not result in new roads or water supply utilities. Therefore, the Provisions would not directly induce growth.

7.6.2 Population Growth

Possible population growth considered in this analysis is the possible growth in the number of persons that live and work in the areas in and around where the Provisions are implemented, and reasonably foreseeable methods of compliance may be located. Population growth occurs from natural causes (births minus deaths) and net emigration from or immigration to other geographical areas. Emigration or immigration can occur in response to economic opportunities, lifestyle choices, or for personal reasons. Although land use growth and population growth are interrelated, land use and population growth could occur independently from each other. This has occurred in the past where the housing growth is minimal, but population within the area continues to increase. Such a situation results in increasing population densities with a corresponding demand for services, despite minimal land use growth.

Indirect population growth inducement occurs when, for example, a project that accommodates unplanned growth consequently (i.e., indirectly) establishes substantial new permanent employment opportunities (for example, new commercial, industrial, or governmental enterprises). Another example of indirect population growth is if a construction project generates substantial short-term employment opportunities that indirectly stimulate the need for additional housing and services.

Overall development in the state is governed by local General Plans (developed by counties or cities), which are intended to plan for land use development consistent with California law. The General Plan is the framework under which development occurs, and, within this framework, other land use entitlements (such as variances and conditional use permits) can be obtained.

The construction of structural controls could generate economic opportunities in an area or region, but such methods of compliance is not expected to result in or induce substantial growth or significant growth related to population increase or land use development. The majority of the new work opportunities or duties that could possibly be created to comply with the Provisions are expected to be filled by persons already employed already employed and residing in the area or region.

New economic opportunities could occur in the operation and maintenance of a new or updated structural controls. For example, installing new treatment processes may require new expertise, which would result in the hiring of new staff.

7.6.3 Existing Obstacles to Growth

The environmental analysis is required to discuss ways in which the proposed project could foster economic or population growth or the construction of additional housing. Included in this analysis is consideration as to whether the Provisions (or the reasonably foreseeable methods of compliance) remove obstacles to population growth or may encourage and facilitate other activities that could significantly affect the environment (see Cal. Code Regs., tit. 14, § 15126.2(d)). Obstacles to growth could include such things as inadequate infrastructure or public services, such as an inadequate water supply that results in rationing, or inadequate wastewater treatment capacity that results in restrictions in land use development. Policies that discourage either natural population growth or immigration also are considered to be obstacles to growth.

The Provisions do not require an increase in infrastructure or public services, or otherwise require the removal of obstacles to growth. Therefore, there will be less than significant impact through the removal of obstacles for growth.

7.7 Cumulative Impacts Analysis

CEQA requires an analysis of the project's contribution to cumulative impact (Cal. Code Regs., tit. 14, §§ 15064(h), 15065(a)(3), 15130.) and is required, at a minimum, as part of the SED checklist (Cal. Code Regs., tit. 23, §§ 3720 – 3781, Section XVIII). CEQA Guidelines section 15355 provides the following definition of cumulative impacts:

"…two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.

(a) The individual effects may be changes resulting from a single project or a number of separate projects.

(b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time."

The cumulative impact analysis need not be performed at the same level of detail as a "project level" analysis but must be sufficient to disclose potential combined effects that could constitute a cumulative significant adverse impact. The CEQA Guidelines direct that cumulative impacts either be assessed through a "list" or "projections" approach. The list approach involves developing a list of past, present, and reasonably foreseeable future projects that would cause impacts similar to the project and address whether the project's impact would be a considerable contribution to a significant cumulative impact caused by past, present, and reasonably foreseeable probable future projects. The projections approach relies on cumulative impact projections of past, present, and reasonably foreseeable future projects contained in an adopted local, regional or statewide plan, or related planning document.

This analysis includes a list of past, present and reasonably foreseeable future statewide projects, and TMDL projects.

7.7.1 List of Related Statewide and Regional Projects

The State Water Board has adopted and is currently developing a wide range of statewide policies, plans and significant general permits. The entire list of statewide policies and significant general permits can be found in the State Water Board's Executive Director's report, which is updated on a monthly basis.[8] While some of these actions are not yet formally proposed, they are within the temporal scope of implementation of the Provisions. These projects could cause environmental impacts that may, in conjunction with impacts of the Provisions, cause a cumulative impact.

In general, these projects would likely require either 1) higher level of wastewater treatment or control (e.g., wastewater treatment plant upgrades) or 2) effluent monitoring. It is not possible to provide a quantitative measure of the impacts from the Provisions and other projects combined. The cumulative impacts analysis entails a general consideration of the major activities that could produce cumulative impacts: construction, operation of a treatment or toxicity control, and vehicle use.

These projects are described in more detail below.

Mercury Reservoir Program

Formal Title: Mercury Control Program for Lakes and Reservoirs

Description: The State Water Board and Regional Water Boards are developing a project to address fish mercury impairments in about 150 reservoirs around the state, with a near-term focus on potential mercury reduction management measures in fewer than ten reservoirs.

Some proposed requirements of the Mercury Reservoir Program include mercury sampling, studies of oxygenation and fisheries management measures, and potentially effluent limitations for wastewater treatment plants that discharge to impaired lakes and reservoirs.

Related Impacts: Some of the toxicity controls could be similar to those selected by a discharger to comply with the Mercury Reservoir Program, including possible wastewater treatment plant upgrades.

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[8] State Water Board Executive Director's Reports are accessible at: [the Executive Director's Report web page https://www.waterboards.ca.gov/board_info/exec_dir_rpts/](https://www.waterboards.ca.gov/board_info/exec_dir_rpts/)

State Implementation Policy (SIP)

Formal Title: Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California

Description: Adopted in 2005, the State Implementation Policy (SIP) applies to discharges of toxic pollutants into the inland surface waters, enclosed bays, and estuaries of California subject to regulation under the State's Porter-Cologne Water Quality Control Act and the federal Clean Water Act. Such regulation may occur through the issuance of NPDES permits or other relevant regulatory approaches. The SIP establishes a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency.

Related Impacts: The SIP is used to derive effluent limitations for wastewater and industrial dischargers for priority pollutants. This policy in combination with other projects and the Provisions could prompt additional upgrades to wastewater and industrial facilities.

Mercury Amendments

Formal Title: Part 2 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California—Tribal and Subsistence Fishing Beneficial Uses and Mercury Provisions.

Description: Adopted by State Water Board on May 2, 2017, the Mercury Amendments provide a consistent regulatory approach throughout the state by setting mercury water quality objectives to protect the beneficial uses associated with the consumption of fish by both people and wildlife. Additionally, the State Water Board established three new beneficial use definitions for use by the State and Regional Water Boards in designating Tribal Traditional Culture (CUL), Tribal Subsistence Fishing (T-SUB), and Subsistence Fishing (SUB) beneficial uses to inland surface waters, enclosed bays, or estuaries in the state. The State Water Board approved one new narrative and four new numeric mercury objectives to apply to those inland surface waters, enclosed bays, and estuaries of the state that have any of the following beneficial use definitions: COMM, CUL, T-SUB, WILD, MAR, RARE, WARM, COLD, EST, or SAL, with the exception of waterbodies or waterbody segments with site-specific mercury objectives.

Related Impacts: The Mercury Amendments could demand a higher level of wastewater treatment from wastewater and industrial dischargers. The Mercury Amendments, in combination with other projects, could prompt additional upgrades to wastewater and industrial facilities

Bacteria Amendments

Formal Title: Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California — Bacteria Provisions and a Water Quality Standards Variance Policy

Description: The State Water Board adopted statewide bacteria water quality objectives and a control program to protect human health in waters designated for water contact recreation (REC-1) from the effects of pathogens. The bacteria objectives are included as Part 3 of the ISWEBE Plan.

Related Impacts: The Bacteria Amendments could demand a higher level of wastewater treatment from wastewater and industrial dischargers. The Bacteria Amendments, in combination with other projects, could prompt additional upgrades to wastewater and industrial facilities.

Biostimulatory Substances Project

Description: State Water Board staff is developing a project to address biostimulatory substances in wadable streams, including nutrients.

Related Impacts: The Biostimulatory Substances Project could demand a higher level of wastewater treatment from wastewater and industrial dischargers. The Biostimulatory Substances Project, in combination with other projects, could prompt additional upgrades to wastewater and industrial facilities.

Recycled Water Policy

Description: Adopted in 2009, the purpose of the Recycled Water Policy is to increase the use of recycled water from municipal wastewater sources that meet the definition in Water Code section 13050, subdivision (n), in a manner that implements state and federal water quality laws. The Recycled Water Policy provides direction regarding the appropriate criteria to be used by the State Water Board and the Regional Water Boards in issuing permits for recycled water projects. Additionally, the Recycled Water Policy encourages every region in California to develop a salt/nutrient management plan by 2014 that is sustainable on a long-term basis and that provides California with clean, abundant water. State Water Board staff is proposing a resolution for the State Water Board's consideration regarding updating the Recycled Water Policy.

Related Impacts: The Recycled Water Policy could demand a higher level of wastewater treatment from wastewater and industrial dischargers, so that the water may be reused. The Recycled Water Policy, in combination with other projects, could prompt additional upgrades to wastewater and industrial facilities.

Procedures for Dredged and Fill Materials (Formerly the Wetlands Policy)

Formal Title: Amendment to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California to Establish a State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State

Description: The Procedures for Dredged and Fill Materials has the goal of developing: 1) a wetland definition; 2) wetland delineation procedures; and 3) procedures for applications, and the review and approval of water quality certifications, WDRs, and waivers of WDRs for discharges of dredged and fill materials.

Related Impacts: The Procedures for Dredged and Fill Materials is not expected to lead to higher level of wastewater treatment from wastewater and industrial discharger, or a change in monitoring. Therefore, there should not be considerable cumulative impacts associated with this project.

The Trash Amendments

Formal Titles: Amendment to the Water Quality Control Plan for the Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

Description: The State Water Board adopted the Trash Amendments April in 2015 and Office of Administrative Law and U.S. EPA approved them in December 2015 and January 2016, respectively. The Trash Amendments include six elements: (1) a water quality objective, (2) applicability, (3) prohibition of discharge, (4) implementation provisions, (5) time schedule, and (6) monitoring and reporting requirements. The Trash Amendments apply to all surface waters of the state, with the exception of those waters within the jurisdiction of the Los Angeles Water Board with trash or debris TMDLs that are in effect prior to the effective date of the Trash Amendments.

Related Impacts: The Trash Amendments require dischargers to control litter and will be implemented through NPDES storm water permits (MS4s, Department of Transportation, Industrial General Permit, and Construction General Permit), WDRs, and waivers of WDRs. The Trash Amendments identify a potential increase in vehicle use of litter/solid waste collection. In contrast, the Provisions are not expected to result in an increase in vehicle use due to litter/solid waste collection, and because it is more efficient to gather samples for multiple constituents at once, toxicity samples and other water quality samples are usually sampled together, not leading to a vehicular impact. Therefore, a cumulative impact is not expected.

General Storm Water Permits

Description: Major statewide permits for storm water pertain to industry, construction, or MS4s. Municipalities serving between 100,000 and 250,000 people are required to apply for Phase I MS4 permits, while smaller municipalities and non-traditional permittees (e.g. some state parks) are enrolled in the general Phase II MS4 permit. Storm water discharges arising from projects carried out by the California Department of Caltrans are regulated under the unique statewide Caltrans Permit. Construction projects that disturb one or more acres of soil are required to enroll in the Construction General Permit. A defined set of industrial dischargers are required to enroll in the Industrial General Permit. These permits are revised every several years and the requirements are updated.

Related Impacts: Discharger may be required to perform activities such as monitoring under the General Storm Water Permit, which could increase vehicle use and impacts greenhouse gases and air quality. The Provisions do not require stormwater dischargers to monitor for toxicity.

Because it is more efficient to gather samples for multiple constituents at once, toxicity samples and other water quality samples are usually sampled together, not leading to a vehicular impact. Therefore, a cumulative impact is not expected.

Regional Water Board TMDLs

Description: In addition to the State Water Board developing or adopted projects, the Regional Water Boards have recently adopted and are in the process of developing a variety of amendments to their respective basin plans including TMDLs for different pollutants, as well as issuing various permits throughout the state. Examples include: TMDL for Toxicity, Chlorpyrifos, and Diazinon in the Calleguas Creek (Los Angeles Board), TMDLs for the Sacramento River and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges (Central Valley Region), Napa River Watershed – Pathogens (San Francisco Bay Water Board), Implementation Plans for the TMDLs for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries (Los Angeles Water Board), Recreation Standards for Inland Fresh Surface Waters (Santa Ana Water Board), and Revised TMDL Daily Loads for Indicator Bacteria (San Diego Water Board).

Related Impacts: The main goal of all of the Water Boards' actions is to protect and improve the quality of the state's waters. Implementation measures identified during the development of these policies, amendments, and basin plan amendments, as well as the reasonably foreseeable methods of compliance for these actions, may have similar potential impacts as those identified for the Provisions, for example, a higher level of treatment of wastewater, and effluent monitoring.

Probable Future Toxicity TMDLs

The Water Boards are likely to undertake additional toxicity TMDL projects in the future. Although waters may be listed as an impaired waterbody for both known and unknown toxicants, if the toxicant responsible for the impairment is unknown, an assessment is typically conducted to discover the cause of toxicity prior to the development of a TMDL. Any probable TMDL for the control of toxicity will likely target specific sources of the toxicant, which could lead to controls similar to those that could be selected by a discharger in response to the Provisions.

7.7.2 Cumulative Impacts of the Provisions and Other Water Board Projects

The cumulative impacts of other developing or adopted State Water Board statewide projects in combination with the Provisions are anticipated to have cumulative impacts. The cumulative impacts are discussed below by: 1) construction and operation and maintenance of a higher level of wastewater treatment or control (e.g., wastewater treatment plants upgrades) or 2) effluent monitoring (that could result in increased vehicle use).

As discussed previously, the possibility that any given discharger would implement a specific toxicity control as a method of complying the requirements in the Provisions is speculative. In those rare cases where new toxicity controls may be selected, potential projects would be spread out across the state and any potential impacts would be localized, and measures could be taken to reduce or eliminate impacts. Construction would also be of a temporary nature, so that it is unlikely that several construction projects associated with the Provisions would occur within the same time period.

Two of the environmental documents prepared for the five projects reviewed by the State Water Board identified significant cumulative impacts to air quality. Specifically, they found that construction-related emissions of particulates less than 10 microns in diameter (PM10) would be reduced to a less-than-significant level with the implementation of best management practices and other mitigation measures. Although temporary, the project proponents determined these emissions would produce a locally significant cumulative impact, if construction of their projects occurred simultaneously with construction of other projects in the vicinity. However, these projects were the City of Merced's treatment plant expansion, which involved a construction- related activity not associated with a toxicity upgrade, and the EchoWater project, which is the most recent major wastewater treatment facility in the state (greater than 20 MGD), to upgrade to tertiary treatment.

Past, present, and future statewide projects could lead to the selection of controls and upgrades of facilities to address water quality concerns. These upgrades and controls could serve the purpose of addressing multiple concerns (such as upgrades to address toxicant specific issues at a plant, or to address unknown toxicity concerns) and therefore the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects may not result in a cumulative significant impact. However, as it is possible that different new or upgraded controls may be selected for the projects, there could be impacts associated with construction and earth moving activities of these projects. Therefore, there could be significant cumulative impacts from the construction of structural controls.

Additionally, in a state with a high water demand such as California, water reuse is becoming a high priority, and the State Water Board has adopted the Policy for Water Quality Control for Recycled Water (Recycled Water Policy) to aggressively pursue development of recycled water projects. This Recycled Water Policy established a mandate to increase recycled water use to 300,000 acre-feet annually by 2030 and requires that the water used be treated to tertiary standards. The combination of forthcoming statewide water quality standards, plus the demand for higher levels of water quality for new initiatives such as the Recycled Water Policy, will increase demands for tertiary treatment across the state. If every wastewater treatment plant in the state upgraded to tertiary treatment (every plant that does not already provide tertiary treatment) it would result in over a hundred construction projects and earth moving activities throughout the state.

The only potentially significant impact identified in the sections above due to O/M activities was greenhouse gas emissions. The California Air Resources Board announced July 11, 2018, that greenhouse gas pollution in California fell below 1990 levels for the first time since emissions peaked in 2004 (CARB 2018). The cumulative effect of all of the programs and activities related to greenhouse gas emissions has been a reduction in emissions. Therefore, any contributions resulting from State Water Board requirements are not causing significant cumulative impacts. As greenhouse gas emissions have reached 1990 levels this year and adverse cumulative effects are not anticipated.

Increased vehicle use may result from a variety of methods of compliance for all statewide projects. Vehicles are used to ship samples, perform maintenance and for any construction or earth moving projects. Vehicle use will also result from a wide variety of other projects occurring in the state from either new government policies or regulations that require monitoring and enforcement or from development of new housing, commercial facilities, or public infrastructure. Because it is more efficient to gather samples for multiple constituents at once, toxicity samples and other water quality samples are usually sampled together, not leading to a vehicular impact. Given that the emissions impacts stemming from toxicity controls are minimal and less than significant to such an extent to not be a considerable contribution to potentially significant cumulative impacts related to traffic, air quality and greenhouse gas emissions, any resulting cumulative effects associated with the proposed project are considered less than significant.

In conclusion, cumulative effects associated with the proposed project could be potentially significant.

8 PROJECT ALTERNATIVES

Applicable regulations (Cal. Code Regs., tit. 23, § 3777, subd. (b)(3)) require the SED to contain an analysis of a range of reasonable alternatives to the project and reasonably foreseeable methods of compliance that could feasibly meet the project objectives to avoid or substantially reduce any potentially significant adverse environmental impacts. A detailed analysis of the project options is discussed in Chapter 5, Analysis of Project Options. Chapter 6 of the Staff Report discusses the reasonably foreseeable methods of compliance and possible toxicity controls that may result from the Provisions, and Chapter 7 of the Staff Report analyzes the potential environmental impacts that may result from the project, the reasonably foreseeable methods of compliance, and possible toxicity controls. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely, Chapter 6 includes a discussion on possible toxicity controls. The analysis in Chapter 7 identifies potentially significant environmental impacts from the possible toxicity controls.

No potentially significant impacts were identified in Chapter 7 related to the methods of compliance with the Provisions (i.e., no potentiality significant impacts from monitoring are expected). The potentially significant environmental impacts identified in Chapter 7 are related to construction activities from possible toxicity controls. In addition, a potentially significant environmental impact related to greenhouse gas emissions was identified in Chapter 7 related to the operation and maintenance of possible toxicity controls. As discussed previously, the possibility that any given discharger would implement a specific toxicity control as a method of complying with the requirements in the Provisions is speculative. Whether a discharger would choose to implement additional toxicity controls as a result of the Provisions to address toxicity would depend, in part, on whether the discharger already needs to comply with existing toxicant-specific or existing aquatic toxicity monitoring requirements, effluent limitations, or receiving water limitations. Many dischargers already implement toxicity controls, making the likelihood of an upgrade unlikely. Whether a discharger chooses to implement additional toxicity controls may also depend on the nature, type, and persistence of any toxicity detections, and whether the cause of the toxicity or the identity of the toxicant is determined.

In addition, any additional toxicity control may result from existing pollutant specific requirements, rather than the Provisions. The Water Boards do not mandate the manner of compliance (see Water Code section 13360(a)), so any discharger that chooses to implement a toxicity control is free to select any particular toxicity control or combination of toxicity controls. If a discharger chooses to implement an additional toxicity control, the discharger’s selection of one or more particular toxicity controls would depend on the type of facility, the type of toxicity controls already in place at the facility, and the quality of the existing effluent of the discharger. The type of toxicity control selected by the discharger could also depend on whether the cause of the toxicity (e.g., malfunctioning equipment) or the toxicant (e.g., identification of high copper amount in the effluent) are identified. The type of toxicity control selected by the discharger could also depend on whether the cause of the toxicity (e.g., malfunctioning equipment) or the toxicant (e.g., identification of high copper amount in the effluent) are identified. It is more likely that dischargers would select toxicity controls that are less expensive and have lower environmental impact (e.g., institutional toxicity controls or optimization of existing structural toxicity controls) rather than toxicity controls that are more expensive and have higher environmental impacts (e.g., new structural toxicity controls). Ultimately, however, it is unclear which toxicity control would be selected.

Therefore, the possibility that any particular discharger might implement additional toxicity controls as a result of the Provisions is speculative. To the extent that a discharger does choose to implement additional toxicity controls as a result of the Provisions, the possibility that the discharger would choose to implement any particular toxicity control, or any combination of particular toxicity controls, out of the many different types of toxicity control(s) is also speculative.

Project-level impacts will necessarily vary depending on the toxicity control and the size, location, and type of discharger and the environmental resources in and around the project site.

This Chapter of the Staff Report includes a discussion of the alternatives that would avoid or substantiality lessen the potentially significant impacts from the construction, operation, and maintenance of possible toxicity controls. As no potentially significant effects were identified from the reasonably foreseeable methods of compliance or the project, these alternatives are not those capable of avoiding or substantially lessening the significant environmental impacts of the project. This discussion is included for purposes of informing decision makers and the public of any possible effects, however unlikely, and associated project alternatives.

A discharger may choose to install a toxicity control after detecting and identifying persistent toxicity. Therefore, the alternatives discussed below are those capable of avoiding or substantially lessening the significant environmental effects of the possible toxicity controls: alternatives that reduce the identification of persistent aquatic toxicity.

The three project alternatives are:

- Alternative 1- No Project
- Alternative 2- Revise Provisions to change what is considered toxic
- Alternative 3- Revise Provisions to reduce detection of toxicity

8.1 Alternative 1- No Project

The purpose of assessing a no project alternative is to allow decision makers and the public to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. This alternative is discussed in more detail throughout Chapter 5 under the “No Action” options. As no potentially significant effects were identified from the reasonably foreseeable methods of compliance or the project, this alternative is not discussed in terms of avoiding or substantially lessening the significant environmental impacts of the project. In order to provide additional information, this alternative is discussed as an alternative that would avoid or substantiality lessen the potentially significant impacts from the construction and operation and maintenance of possible toxicity controls.

Under the no project alternative, a statewide numeric water quality objective would not be adopted, and the existing Regional Water Board basin plan narrative freshwater aquatic toxicity objectives would remain in place. Additionally, a program of implementation would not be adopted thus, there would be no statewide consistency for the implementation of the Regional Board narrative objectives. Regional Water Boards could either incorporate implementation requirements in their regional basin plans or continue to establish implementation requirements on a permit-by-permit basis. Under this alternative, there would be no change from the current conditions to the interpretation of the narrative toxicity water quality objectives in the basin plans, setting effluent limitations in permits, establishing reasonable potential, or in the monitoring frequency for non-storm water NPDES dischargers. Effluent limitations would continue to be inconsistently applied to NPDES permits throughout the state. Continuing a system that relies on only narrative water quality objectives does not produce standardized and comparable measurements of toxicity based on measurements of biological responses.

Since the “no project” alternative does not clearly define unacceptable levels of toxicity, creating inconsistent determinations regarding the presence of toxicity, it is possible that persistent toxicity would not be identified for an individual facility. Under this alternative the discharger would be unlikely to implement any of the toxicity controls, thereby reducing or avoiding the potential significant impacts from the construction and operation and maintenance of the toxicity control, as identified in Chapter 7 of the Staff Report.

This option would fail to meet the four project goals (Section 2.3 of the Staff Report) as it would (1) not provide consistent, statewide water quality objectives; (2) not provide a program of implementation; (3) not create a consistent toxicity monitoring program; and (4) not incorporate a statewide statistical approach.

8.2 Alternative 2- Revise Definition of a Toxic Response to Aquatic Life

In this alternative the numeric definition of unacceptable toxicity would be changed by establishing a less protective effect level in the effluent or sample water. This could be accomplished by either 1) establishing a numeric water quality objective for acute toxicity but not for chronic toxicity, or 2) establishing numeric water quality objectives for acute and chronic toxicity using less stringent RMDs. As no potentially significant effects were identified from the reasonably foreseeable methods of compliance or the project, this alternative is not discussed in terms of avoiding or substantially lessening the significant environmental impacts of the project. In order to provide additional information, this alternative is discussed as an alternative that would avoid or substantiality lessen the potentially significant impacts from the construction and operation and maintenance of possible toxicity controls.

8.2.1 Establish a Numeric Water Quality Objective Only for Acute Toxicity

Under this alternative, the Provisions would establish a numeric water quality objective for acute toxicity but not for chronic toxicity. This would include a program of implementation similar to that in the Provisions for acute toxicity. Without a numeric water quality objective for chronic toxicity, this alternative would not include a program of implementation related to chronic toxicity, and would not include provisions related to reasonable potential analysis for chronic toxicity, effluent limitations, TREs, etc.

The acute toxicity water quality objective and acute effluent limitations may not identify chronic toxic effects. This may result in a reduced number of aquatic toxicity detections. As discussed previously, the possibility that any given discharger would implement a specific toxicity control as a method of complying with the requirements in the Provisions is speculative. However, a reduced number of aquatic toxicity detections would lead to an even less likely scenario wherein a discharger would choose to implement a corrective action, including implementing possible toxicity controls that may have potentially significant environmental impacts identified in Chapter 7 of the Staff Report. Therefore, any potentially significant impacts resulting from the construction or operation and maintenance of toxicity controls for chronic toxicity would be avoided or reduced.

However, establishing only the acute toxicity water quality objective would fail to provide comprehensive protection of water quality as it would not account for long term effects of potential toxicants in water. This alternative would fail to meet goal 1 of the project, "[a]dopt consistent, statewide water quality objectives for acute and chronic toxicity that are protective of California's waters from both known and unknown toxicants," and could hinder the success of project goal 2, which is to "[a]dopt a program of implementation to control toxicity in discharges…" If chronic toxicity is present in a discharge that is not monitored for chronic toxicity, the toxic effects may go undetected, causing detrimental effects to aquatic life beneficial uses.

8.2.2 Use Less Stringent Regulatory Management Decisions

Under this alternative, the chronic and acute water quality objectives would incorporate less stringent RMDs, making them less protective of water quality. Since the effluent limitations incorporate a pass or fail based on the water quality objectives, a less stringent RMD in the water quality objectives would impact the effluent limitations, making them less stringent as well. These less stringent water quality objectives and effluent limitations would result in a lower likelihood that persistent toxicity would be identified in an effluent (compared to the Provisions) and that dischargers would choose to implement toxicity controls that may have the potentially significant environmental impacts identified in Chapter 7 of the Staff Report.

Less stringent water quality objectives and effluent limitations would be less protective of water quality, beneficial uses, and aquatic habitat protection, and would thereby fail to meet project goal 1, which is to be "…protective of California's waters from both known and unknown toxicants." Additionally, selecting new RMDs would require extensive scientific study and analysis, including peer review, further delaying the project.

8.3 Alternative 3- Reduce the Detection of Toxicity

The potentially significant environmental impacts identified in Chapter 7 of the Staff Report are associated with possible toxicity controls to reduce toxicity in discharges. Toxicity controls may be implemented by a discharger in response to detecting persistent toxicity in their discharge, such as constructing upgrades to treatment facilities. The reasonable potential analysis requirements and the increased monitoring frequency for some non-storm water NPDES dischargers contained in the Provisions may increase the likelihood that dischargers identify persistent toxicity. If a discharger were to identify persistent toxicity that discharger may choose to implement toxicity controls identified in Chapter 6 of this Staff Report. In this alternative, the Provisions would be revised to reduce the probability that persistent toxicity would be identified. This could be accomplished by 1) removing the program of implementation from the Provisions, or 2) altering the program of implementation in the Provisions to reduce the probability that persistent toxicity will be detected in discharges. As no potentially significant effects were identified from the reasonably foreseeable methods of compliance or the project, this alternative is not discussed in terms of avoiding or substantially lessening the significant environmental impacts of the project. In order to provide additional information, this alternative is discussed as an alternative that would avoid or substantiality lessen the potentially significant impacts from the construction and operation and maintenance of possible toxicity controls.

8.3.1 Do Not Establish a Program of Implementation

Under this alternative, acute and chronic toxicity numeric water quality objectives would be established without a program of implementation. This alternative would not include implementation requirements related to conducting a reasonable potential analysis, monitoring frequency, or determining when a discharger must conduct a TRE. The Provisions would also not specify that all POTWs that are authorized discharge at a rate of 5 MGD or greater are required to conduct routine chronic toxicity monitoring. Regional Water Boards would either specify these requirements in their regional basin plans or establish these requirements on a permit-by-permit basis.

By not establishing a program of implementation, Regional Water Boards would have the option to establish a reasonable potential analysis that may result in fewer facilities determined to have reasonable potential. Regional Water Boards may also establish less frequent monitoring for chronic toxicity and establish a different procedure for determining when a TRE is required.

These changes may decrease the probability that persistent toxicity would be identified for an individual facility, which may decrease the probability that any given discharger would implement additional toxicity controls, thereby reducing or avoiding potential significant environmental impact from the construction or operation and maintenance of additional toxicity controls.

However, this alternative would be less protective of aquatic life than the Provisions. This alternative would fail to meet project goal 2, which is to "[a]dopt a program of implementation to control toxicity in discharges…" and goal 3, which is to "[c]reate a consistent, yet flexible framework for monitoring toxicity and laboratory analysis". Furthermore, the removal of a program of implementation would fail to meet goal 4, which is "[i]ncorporate a statewide statistical approach…" as each Regional Board would be tasked with determining how toxicity results should be analyzed on a permit-by-permit or region-by-region basis. Finally, it would be an inefficient and potentially ineffective use of staff time and state resources if each Regional Water Board were to develop their own program of implementation, as this would prove costly and there is no guarantee the individual programs would prove more effective at controlling aquatic toxicity than what is currently proposed.

8.3.2 Revise the Program of Implementation

Under this alternative, acute and chronic aquatic toxicity numeric water quality objectives would be established, with a program of implementation that reduces the probability that persistent toxicity would be detected and identified. This could be accomplished through altering the reasonable potential analysis requirements in the Provisions, which could result in fewer dischargers being required to conduct routine acute and/or chronic toxicity monitoring. This could also be accomplished by changing the chronic toxicity routine monitoring frequencies in the Provisions, so that dischargers are required to conduct fewer chronic aquatic toxicity tests.

The program of implementation in the Provisions could be revised to increase the percent effect required for reasonable potential analysis from 10 percent to a higher percent effect, such as 20 or 25 percent. If the percent effect for reasonable potential is changed to match the RMD, not as many dischargers would have reasonable potential and, therefore, would not have effluent limitations and toxicity monitoring requirements. This alternative could also require POTW dischargers authorized to discharge at a rate equal to or greater than 5 MGD and that are required to have a pretreatment program by the terms of 40 CFR § 403.8(a) (effective January 1, 2020) to conduct a reasonable potential analysis for chronic toxicity, rather than requiring them to conduct routine chronic toxicity monitoring and comply with effluent limitations.

This would fail to meet project goal 2, which is to "[a]dopt a program of implementation to control toxicity in discharges and achieve and maintain the toxicity water quality objectives in California waters" as assigning reasonable potential only after an exceedance of the water quality objective would not effectively achieve or maintain the toxicity water quality objectives.

The program of implementation could also be revised to reduce the frequency of monitoring for chronic toxicity. For example, dischargers with reasonable potential that are authorized to discharge at a rate equal to or greater than 5 MGD could be required to conduct quarterly routine chronic toxicity monitoring rather than monthly routine chronic toxicity monitoring.

Dischargers with reasonable potential that are authorized to discharge at a rate of less than 5 MGD could be required to conduct annual routine chronic toxicity monitoring rather than semiannual or quarterly routine chronic toxicity monitoring. This approach may result in less monitoring for some dischargers.

Due to the nature of discharge from many POTWs, and the potential for toxic discharge from any permittee, this approach would likely miss toxic events and therefore also fail to meet project goal 1. This alternative would not be adequately protective of water quality, beneficial uses, or aquatic habitat.

9 WATER CODE SECTION 13241 AND OTHER REQUIRED CONSIDERATIONS

This section addresses considerations required by Water Code section 13241 for the development of water quality objectives, Water Code section 13242 for the development of a program of implementation, antidegradation policies, and AB 685 on the human right to water.

9.1 Considerations Required by Water Code Section 13241

In accordance with Water Code section 13241 subsections (a)-(f), the Water Boards are required to establish water quality objectives to "ensure the reasonable protection of beneficial uses and the prevention of nuisance[.]" In doing so, the following factors must be considered:

1) Past, present, and probable future beneficial uses of water.
2) Environmental characteristics and water quality of the hydrographic unit(s) under consideration.
3) Water quality conditions that could be reasonably attained through coordinated control of all factors affecting water quality.
4) Economic considerations.
5) The need for developing new housing.
6) The need to develop and use recycled water.

The Provisions would establish new water quality objectives; therefore, California Water Code section 13241 applies and the assessment of each factor is discussed below.

9.1.1 Past, Present, and Probable Future Beneficial Uses of Water

The presence of aquatic toxicity can impair aquatic life beneficial uses including, but not limited to, warm freshwater habitat (WARM), cold freshwater habitat (COLD), wildlife habitat (WILD), estuarine habitat (EST), preservation of rare, threatened, or endangered species (RARE), migration of aquatic organisms (MIGR), spawning reproduction and/or early development (SPWN), marine habitat (MAR), inland saline water habitat (SAL), and wetland habitat (WET). These uses are not limited in their duration and apply in both wet and dry weather conditions. The Provisions do not designate or de-designate beneficial uses, but rather put forth statewide numeric water quality objectives and a program of implementation to protect all aquatic life beneficial uses in the state's inland waters, enclosed bays, and estuaries.

9.1.2 Environmental Characteristics and Water Quality of the Hydrographic Units Under Consideration

The environmental characteristics of all hydrographic units affected by the Provisions are thoroughly described in Chapter 4 and Appendix C. The Provisions apply to all waters of the state that are inland surface waters, enclosed bays, estuaries, or lagoons. California is divided into 10 bioregions: Modoc, Klamath/North Coast, Sacramento Valley, Bay Area/Delta, Sierra, San Joaquin Valley, Central Coast, Mojave Desert, South Coast, and Colorado Desert. These 10 bioregions include desert environments, fertile valleys, coastal regions, foothills, alpine mountainous environments, and more. See Appendix C for detail information on the bioregions of California, including information on wet and dry climate conditions.

9.1.3 Water Quality Conditions that Could Reasonably be Achieved Through Coordinated Control of All Factors Affecting Water Quality

The proposed numeric water quality objectives for aquatic toxicity would ensure the protection of aquatic life beneficial uses in the state's inland surface waters, enclosed bays, and estuaries. Factors that affect aquatic toxicity in the state's inland surface waters, enclosed bays, and estuaries are municipal and industrial point sources, storm water, and natural and human-caused non-point sources. Another factor is hydrology, including wet weather and dry weather flow regimes.

The Water Boards are required to ensure that all discharges, regardless of type, comply with all water quality control plans and policies. The proposed water quality objectives for aquatic toxicity and implementation provisions shall be implemented, where applicable, through NPDES permits issued pursuant to section 402(p) of the Federal Clean Water Act, water quality certifications issued pursuant to section 401 of the Clean Water Act, WDRs, waivers of WDRs, and, if appropriate, TMDLs.

TMDLs are a significant method used to coordinate control of all factors that affect water quality. Federal regulations (40 CFR § 130.7) require that TMDLs include waste load allocations for point sources and load allocations for nonpoint sources and natural background levels and that the individual sources for each must be identified and enumerated. The TMDL for a given pollutant and water body is the total amount of pollutant that can be assimilated by the receiving water while still achieving objectives. The TMDL is equal to the sum of individual waste load allocations, load allocations, and natural background, plus a margin of safety.

In the context of TMDLs, pollutant sources are categorized as either point sources or nonpoint sources. A point source as defined in the Clean Water Act means any discernible, confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged (40 CFR §122.2). These types of discharges are regulated through a NPDES permit. Discharges of storm water and non-storm water through MS4s are point sources per the Clean Water Act. Nonpoint sources originate from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. The term "nonpoint source" is defined to mean any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the Clean Water Act. Discharges from irrigated agriculture, for example, are nonpoint sources.

Although waters may be listed as an impaired water body for both known and unknown toxicants, if the toxicant responsible for the impairment is unknown, an assessment is typically conducted to discover the cause of toxicity prior to the development of a TMDL. Therefore, few TMDLs address aquatic toxicity. However, as of January 2018 there were approximately 68 TMDLs for known toxicants, such as pesticides, metals, and chemicals in California water bodies and an additional 35 TMDLs in California for nitrogen or other biostimulatory substance that may cause or contribute to toxicity. Six TMDLs that address aquatic toxicity are listed in section 3.4 of this Staff Report. All toxicity related TMDLs will remain in effect under the Provisions.

Hydrology and wet and dry weather conditions can affect aquatic toxicity in the state's inland surface waters, enclosed bays, and estuaries. For example, storm water runoff during rainfall events may carry toxicants to waterbodies. Higher instream flows during rainfall events or snowmelt may dilute other toxicants. Low instream flows during dry weather conditions may concentrate toxicants.

The numeric water quality objectives for aquatic toxicity would ensure the protection of aquatic life uses in both wet and dry weather flow conditions as the objectives are based upon an assessment of the effect of a sample of concern at the IWC relative to a control. The IWC accounts for instream flow conditions as it is the concentration of effluent in the receiving water after mixing. Additionally, permits and TMDLs include wet and dry weather information specific to a facility, type of discharge, or individual waterbody. For example, flow rates are included in NPDES permits and TMDLs include seasonal considerations. In either wet or dry conditions, sources of toxicity need to be controlled to protect aquatic life beneficial uses. Sections 6.3, 6.4, and 6.5 describe a wide variety of possible toxicity controls that may be selected by a discharger to reduce toxicity in wet or dry weather conditions.

9.1.4 Economic Considerations

Under the requirements of Water Code sections 13170 and 13241, subdivision (d), and the California Code of Regulations, title 23, section 3777, subdivisions (b)(4) and (c), the State Water Board must consider economics when establishing water quality objectives. This consideration of economics is not a cost-benefit analysis and, particularly with respect to the analysis required by the certified regulatory program, the State Water Board is not required to engage in speculation or conjecture and the consideration of economics should include consideration of potential costs of the reasonably foreseeable measures to comply with the Provisions.

This section includes estimated economic costs for non-storm water NPDES dischargers and for storm water and nonpoint source dischargers. Estimated costs for non-storm water NPDES dischargers are categorized by monitoring costs, species sensitivity screening costs, costs associated with conducting TREs, and treatment control costs.

In July 2018, the *Economic Considerations of Proposed Whole Effluent Toxicity Control Provisions for California*, referred to as the 2018 Economic Report, was completed by Abt Associates Inc. (Abt Associates Inc. et al., 2018). Abt Associates provided an analysis of economic factors related to the Provisions, including the costs of monitoring. Furthermore, the analysis was based on then-current data and the costs reflected “only incremental expenditures associated with the Provisions (not controls needed to comply with existing regulatory requirements)” (Abt Associates 2018. p 1-2). In the 2018 Economic Report, Abt Associates focused on a sample of 14 representative non-storm water NPDES facilities (e.g., municipal WWTPs, refineries, and other types of industrial dischargers). For the sample facilities, Abt Associates estimated baseline costs under existing permit requirements and then compared baseline costs to costs associated with species sensitivity screening, monitoring, and conducting TREs as would be required per the Provisions.

Subsequent to completing the 2018 Economic Report, changes were made to the Provisions that impact the economic considerations. In some cases, potential costs in the 2018 Economic Report are no longer applicable. In addition, new data about facility design flows, toxicity monitoring regimes, and prices for toxicity tests became available. In order to address changes that were made to the Provisions and to incorporate available data, an additional economic report was prepared in February 2020 to provide further information and estimates of incremental costs. This document, also titled *Economic Considerations of Proposed Whole Effluent Toxicity Control Provisions for California,* hereinafter referred to as the 2020 Economic Report, is a revision of the 2018 Economic Report. The author is PG Environmental and Eastern Research Group.

The 2018 Economic Report described the applicable toxicity criteria and implementation procedures that provided the baseline for an analysis of the incremental costs of the October 19, 2018 Draft Provisions. The analysis reviewed and summarized the affected dischargers including NPDES-permitted dischargers, and dischargers subject to WDRs (municipal and industrial wastewater dischargers, storm water dischargers, and irrigated agriculture). The analysis also reviewed a description of the Provisions, looking at the objectives and the implementation program. The 2020 Economic Report was conducted in a similar manner but focused on costs associated with the July 25, 2019 First Revised Draft Provisions. State Water Board staff further analyzed and summarized economic considerations associated with the July 7, 2020 Second Revised Draft Provisions.

9.1.4.1 Non-Storm Water NPDES Dischargers

9.1.4.1.2 Sample Collection and Transport Costs

PG Environmental did not include costs associated with sample collection and shipping in the per test unit costs in the 2020 Economic Report. The analysis assumes that POTW dischargers required to monitor chronic toxicity at a monthly or quarterly frequency under the Provisions would also have monthly or quarterly monitoring requirements for other pollutants. The 2020 Economic Report assumes that the aquatic toxicity samples required by the Provisions can be collected at the same time as other pollutant samples with minimal additional effort and costs. For those non-storm water NPDES dischargers that do not use in-house laboratories, sample transportation and shipping costs due to the Provisions are also likely to be minimal because additional aquatic toxicity samples can be shipped with other samples.

If a non-storm water NPDES discharger does not collect and ship aquatic toxicity samples with other pollutant samples and the discharger is required to sample more frequently as a result of the Provisions, then the discharger may incur additional costs from collecting and transporting samples for toxicity tests to analytical laboratories.

Staff calculated a range of potential shipping costs for toxicity samples and provide an example of contracted sample collection costs. Without expenditure records or information regarding which facilities may collect and ship samples independent of other required sampling, the mode of transportation, and the distance from the discharge location to the laboratory, it is not possible to provide an detailed estimate of sample collection and shipment costs for aquatic toxicity.

To provide a range of potential toxicity sample shipping costs, staff determined the cost for a discharger to send effluent samples from its facility to an ELAP-accredited testing laboratory through a commercial shipping company. Staff assumed that a toxicity test would require an initial sample of four liters (approximately one gallon) of effluent (U.S. EPA 2002b, 2002c). A chronic static renewal toxicity test, such as for *C. dubia* reproduction, requires two additional water samples of the same volume. In total, there would be three separate shipments of four liters of water, plus packaging, from the facility to the laboratory.

Toxicity samples are typically taken in one-gallon glass containers. Once taken, the sample containers are placed in insulated containers, which are packed with ice to maintain a temperature of 4° C throughout transport. Often, the insulated container is a simple plastic ice chest. It was assumed that samples would be collected onsite by facility employees, then shipped through a commercial carrier leaving from the facility or from the nearest service location. Given the 36-hour holding requirement for both the initial sample and renewal water, it was assumed that sample water would be delivered overnight, such that it would be delivered to the laboratory within 24 hours of collection.

Staff calculated the cost of sending a sample using FedEx®, a major commercial shipping company. Staff used FedEx's rate calculator web site, available at https://www.fedex.com/en-us/home.html). The rate calculator required an origination location, a destination location, and an estimated package weight. A "package" in this case would be comprised of the water sample, the container for the water sample, the shipping container, and ice to maintain low temperatures. The total weight of a typical package was calculated as 54 pounds. Calculation of the total weight based is described in Table 9-1.

Table 9-1. Estimated weights for shipping one standard toxicity sample

Component	Estimated Weight in Pounds
Sample water (4 liters)	8.8
Sample Container (1 one-gallon glass bottle)	3
Shipping container (60-quart plastic cooler)	12
Ice (three 10-pound bags)	30
TOTAL (Rounded)	**54**

To estimate a maximum cost for shipping a package of this weight, staff used the northernmost city in California that has a wastewater treatment plant (Crescent City) and the southernmost city that has a commercial analytical laboratory (San Diego) as locations of pick-up and delivery, respectively. This is a distance of approximately 850 miles via car. As of March 11, 2020, for a 54 pound package, FedEx would charge up to $467.23 for delivery by FedEx First Overnight®, which would be delivery at 8:00 AM on 3/12/2020. If this price was consistent on subsequent days, then the total price of shipping for a test that requires a total of three samples to be shipped (initial sample and two rounds of refresh water) would be approximately $1,400.

Likely dischargers would choose laboratories located nearer to their location to reduce shipping costs. Delivery at later times using different services and over shorter distances are far less expensive. A package of the same weight picked up in Bakersfield, California and delivered to San Diego by the end of the following day using FedEx Ground® service was $64 per delivery. The total cumulative shipping cost for an aquatic toxicity test requiring two refresh samples would total $192. This range of cost is, however, not representative of all possible sample shipping costs for any facility in the state. Dischargers have discretion on their methods of delivery from a site to any given analytical laboratory. In some cases, dischargers might prefer to contract with a specialty courier company, or might prefer to have facility staff collect and directly deliver samples. The choice of method of delivery and the cost associated with that choice will likely depend on the proximity of the discharge facility to the contract laboratory.

It is possible that in some cases dischargers must use a third party to perform sample collection. It is not known how many and how frequently facilities in the state utilize such services. However, some information is available. The State Water Board contracts with academic laboratories to collect and analyze water quality samples for SWAMP. The State Water Board contracts with the University of California, Davis for these services for water and sediment toxicity. The contracted price for field collection and delivery of water quality samples to UC Davis' analytical laboratory is $1,350 per sampling event, with an additional cost of $630 to collect duplicate samples. Because these prices are for sending a crew to field sites, not discharge facilities, they may be higher than any of those charged by a commercial sampling service.

9.1.4.1.3 Monitoring Costs

The 2020 Economic Report estimated unit costs for laboratory toxicity testing then applied these costs to a complete list of all 325 individually permitted non-storm water NPDES facilities in California that would be affected by the Provisions to estimate laboratory testing costs. Of these, 255 used freshwater species for toxicity testing, and the remaining 70 used marine species. Because of the possibility of significant differences in ranges of prices for freshwater and marine toxicity tests, the 325 facilities were categorized as using freshwater tests (255 facilities) or marine tests (70 facilities), and both groups were analyzed separately.

PG Environmental collected price information for individual toxicity tests from accredited laboratories and produced a set of averages and ranges of prices for these tests. PG Environmental also included ranges and averages for both multiple-concentration and single-concentration test designs if provided by the surveyed laboratories. (PG Environmental, pp. 5-7 to 5-10). Because most of the price data were reported in 2016, all prices were adjusted using the May 2019 consumer price index.

Average prices for all chronic tests examined range from $1,026 to $2,026 for the multi-concentration test designs, and from $602 to $1,311 for the single-concentration test designs. Reported price data by test species are displayed below in Table 9-3 for single concentration tests and in Table 9-2 for multiple concentration tests. Acute and chronic tests are included. Not all laboratories were willing to share price information for individual toxicity tests. Therefore, the range of costs and the averages are estimated costs throughout the state. If dischargers are using laboratories that did not provide costs, prices may be outside the range of costs listed in Tables 9-2 and 9-3.

Table 9-2. Summary of Aquatic Toxicity Costs for Tests Using Multiple-Concentration Test Design

Test Method and Species	Number of Reported Prices	Range (May 2019 $)	Average (2019 $)
Acute Methods			
EPA Method 2000.0 - *Cyprinodon variegatus*	2	$413 to $457	$435
EPA Method 2000.0 - *Oncorhynchus mykiss*	2	$413 to $457	$435
EPA Method 2000.0 - *Pimephales promelas*	11	$251 to $892	$588
EPA Method 2002.0 - *Ceriodaphnia dubia*	9	$307 to $892	$658
EPA Method 2004.0 - *Cyprinodon variegatus*	3	$558 to $837	$744
EPA Method 2006.0 - *Menidia beryllina*	6	$435 to $948	$765
EPA Method 2006.0 - *Menidia peninsulae*	2	$837	$837
EPA Method 2007.0 - *Mysidopsis bahia*	5	$558 to $864	$753
EPA Method 2019.0 - *Oncorhynchus mykiss*	5	$446 to $1,070	$794
EPA Method 2019.0 - *Salvelinus fontinalis*	2	$837	$837
EPA Method 2021.0 - *Daphnia magna*	2	$502 to $837	$669
EPA Method 2021.0 - *Daphnia pulex*	1	$1004	$1,004
EPA Method - *Atherinops affinis*	4	$441 to $948	$731
EPA Method - *Holmesimysis costata*	2	$837	$837
Chronic Methods			
EPA Method 1000.0 - *Pimephales promelas*	2	$1,338 to $1,394	$1,366
EPA Method 1001.0 - *Pimephales promelas*	4	$1,160 to $1,394	$1,303
EPA Method 1002.0 - *Ceriodaphnia dubia*	7	$1,195 to $1,617	$1,380
EPA Method 1003.0 - *Selenastrum capricornutum*	6	$781 to $1,394	$1,026
EPA Method 1005.0 - *Crassostrea gigas or Mytilus sp.*	3	$1,562 to $2,454	$2,026
EPA Method 1006.0 - *Atherinops affinis*	6	$1,193 to $1,617	$1,379
EPA Method 1009.0 - *Macrocystis pyrifera*	4	$1,338 to $2,064	$1,603
EPA method 1014.0 - *Haliotis rufescens*	5	$1,071 to $2,231	$1,675
EPA method 1016.0 - Sand dollar *Dendraster excentricus*; *Strongylocentrotus purpuratus*	3	$1,562 to $2,454	$1,896

Table 9-3. Summary of Aquatic Toxicity Costs for Tests Using Single Concentration Test Design

Test Method and Species	Number of Reported Prices	Range (May 2019 $)	Average (May 2019 $)
Acute Methods			
EPA Method 2000.0 - *Cyprinodon variegatus*	4	$290 to $468	$368
EPA Method 2000.0 - *Oncorhynchus mykiss*	4	$290 to $468	$368
EPA Method 2000.0 - *Pimephales promelas*	19	$201 to $669	$392
EPA Method 2002.0 - *Ceriodaphnia dubia*	12	$201 to $669	$415
EPA Method 2004.0 - *Cyprinodon variegatus*	1	$335	$335
EPA Method 2006.0 - *Menidia beryllina*	4	$218 to $711	$469
EPA Method 2006.0 - *Menidia peninsulae*	0	ND	ND
EPA Method 2007.0 - *Mysidopsis bahia*	3	$335 to $558	$428
EPA Method 2019.0 - *Oncorhynchus mykiss*	11	$290 to $502	$432
EPA Method 2019.0 - *Salvelinus fontinalis*	0	ND	ND
EPA Method 2021.0 - *Daphnia magna*	8	$279 to $627	$448
EPA Method 2021.0 - *Daphnia pulex*	1	$753	$753
EPA Method - *Atherinops affinis*	4	$223 to $711	$471
EPA Method - *Holmesimysis costata*	0	ND	ND
Chronic Methods			
EPA Method 1000.0 - *Pimephales promelas*	1	$669 to $669	$669
EPA Method 1001.0 - *Pimephales promelas*	3	$502 to $725	$602
EPA Method 1002.0 - *Ceriodaphnia dubia*	5	$502 to $1,213	$751
EPA Method 1003.0 - *Selenastrum capricornutum*	4	$390 to $1,046	$610
EPA Method 1005.0 - *Crassostrea gigas or Mytilus sp.*	2	$1,171 to $1,450	$1,311
EPA Method 1006.0 - *Atherinops affinis*	5	$613 to $1,213	$778
EPA Method 1008.0 - Sand dollar *Dendraster excentricus*; *Strongylocentrotus purpuratus*	1	$562 to $562	$562
EPA Method 1009.0 - *Macrocystis pyrifera*	3	$669 to $1,255	$902
EPA method 1014.0 - *Haliotis rufescens*	4	$535 to $1,338	$943
EPA method 1016.0 - Sand dollar *Dendraster excentricus*; *Strongylocentrotus purpuratus*	3	$480 to $1,450	$1,034

9.1.4.1.2.1 Application of Toxicity Testing Costs to Non-storm Water NPDES Dischargers

In applying the range of laboratory testing toxicity costs to estimate compliance monitoring costs for non-storm water NPDES dischargers, the 2020 Economic Report only analyzed costs associated with chronic toxicity testing. The 2018 Economic Report included an analysis of monitoring costs associated with both chronic and acute toxicity monitoring because under previous drafts of the Provisions, non-storm water NPDES dischargers would have been required to conduct a reasonable potential analysis for acute toxicity. It follows that likely some would have then been required to conduct routine monitoring for acute toxicity. However, estimates of acute toxicity monitoring costs were not included in the 2020 Economic Report because the July 2020 Second Revised Draft Provisions leaves acute toxicity reasonable potential analysis and monitoring requirements to the discretion of the Regional Water Board. The 2020 Economic Report states this "… is equivalent to the status quo or baseline policy." (ibid., p. 5-5). Determining which and how many facilities would be required to conduct acute toxicity monitoring, the frequency at which that monitoring would be required and resulting costs is speculative. Table 9-3 includes a summary of costs for conducting an acute toxicity test using a single concentration test design.

In addition, the July 2020 Second Revised Draft Provisions state that "[a] chronic aquatic toxicity test is generally protective of both chronic and acute aquatic toxicity." Therefore, Regional Water Boards may not require an acute toxicity reasonable potential analysis for dischargers that are required to conduct routine chronic toxicity monitoring. This may lead to a reduction in monitoring costs for discharges currently conducting routine monitoring for acute toxicity.

The 2020 Economic Report did not estimate costs associated with flow-through toxicity testing systems as proposed requirements in the Provisions regarding flow-through systems are left to the Regional Water Board's discretion, and estimating costs is speculative.

The 2020 Economic Report estimates the range of baseline aquatic toxicity monitoring costs under current permit requirements and the range of likely monitoring costs for non-storm water NPDES permits issued after the effective date of the Provisions. The range of costs are considered separately for freshwater chronic toxicity tests and marine chronic toxicity tests.

For chronic freshwater aquatic toxicity tests, the test that has the highest potential cost is *C. dubia*, for which some laboratories reported costs up to $1,617 per test. The freshwater chronic toxicity test with the lowest potential cost is *S. capricornutum*, which some laboratories reported costs as low as $781 per test. For marine tests, the highest cost is for *D. excentricus* and the *S. purpuratus* tests at $2,454, and the lowest cost is for *H. rufescens* at $1,071.

For both the freshwater and marine dischargers, PG Environmental sorted numbers of facilities by categories based on estimated changes in monitoring frequencies. For example, there are 30 facilities that currently conduct monthly chronic toxicity routine monitoring using freshwater species that would continue to conduct monthly chronic toxicity routine monitoring under the Provisions; there are six facilities that currently conduct chronic routine monitoring, using freshwater species, at a monthly frequency that would be required to only conduct chronic toxicity routine monitoring at a quarterly frequency under the Provisions; and there are 27 facilities that currently conduct quarterly chronic toxicity routine monitoring, using freshwater species, that would be required to conduct chronic toxicity routine monitoring at a monthly frequency under the Provisions.

For each facility, the baseline (current) monitoring frequencies for chronic toxicity were compared with expected monitoring frequencies that would be required under the Provisions. The current monitoring frequencies were based on a review of permits.

Monitoring frequencies per the requirements of the Provisions were analyzed as if all facilities would be required to conduct routine monitoring for chronic toxicity at the frequency required for facilities that have effluent limitations for chronic toxicity, and that no reduced monitoring frequencies or other modifications to compliance monitoring would be granted by the Regional Water Boards. Per the Provisions, POTW dischargers that discharge 1 MGD or less would monitor biannually, although the Regional Water Board can increase the monitoring frequency. In addition, where no effluent is available to complete a test, the test would not be required for that monitoring period. The results shown in the 2020 Economic Report are therefore a conservative assumption that all facilities that discharge less than 5 MGD would be required to monitor at a quarterly frequency, even though most, if not all, of the 48 POTWs that discharge at a rate of 1 MGD or less that would be subject to the Provisions would likely monitor biannually.

The 2020 Economic Report also assumed that all current tests are conducted using only the single most sensitive species in all cases, although some existing permits still require three species tests. This is a conservative assumption in the analysis that likely increases the estimated costs associated with laboratory testing in the analysis, even though in some cases, a discharger may have to conduct testing with less species and therefore realize a cost savings.

The estimated change in annual monitoring costs for non-storm water NPDES dischargers between current permit requirements and requirements per the Provisions are shown in Tables 9-4 (freshwater) and 9-5 (marine). In order to determine the average annual per-facility change in monitoring costs for facilities that monitor using freshwater species, the highest range of costs for the *C. dubia* chronic test and the lowest range of costs for *S. capricornutum* were multiplied by the change in monitoring frequencies. To determine the average annual per-facility change in monitoring costs for facilities that monitor using marine species, the highest range of costs for the *D. excentricus* and the *S.* purpuratus chronic tests and the lowest range of costs for the *H. rufescens* were multiplied by the change in monitoring frequencies. To get the overall change in costs, the average per facility costs were multiplied by the number of facilities in each category.

For all 325 individually permitted non-storm water NPDES facilities, the 2020 Economic Report found potential annual changes in costs ranging from a savings of $12,490 (i.e., lower costs) to an increase of $28,200. Potential savings were projected to result from a decrease in routine monitoring for chronic toxicity and potential increases in costs were projected to result from an increase in routine monitoring for chronic toxicity. The 2020 Economic Report concluded that “Total statewide chronic toxicity incremental routine monitoring costs are estimated to range from $1,025,000 per year to $2,823,000 per year.” (PG Environmental, p. 6-6). This estimate is for all statewide NPDES facilities and is not an estimate per an individual facility.

Table 9-4. Summary of Changes of Chronic Routine Monitoring Costs for Non-Storm Water NPDES Dischargers, Freshwater Species

Number of Facilities	Current Annual Frequency	Proposed Annual Frequency	Change in Annual Test Frequency	Range of Change in Annual Monitoring Costs	Average Change in Annual Monitoring Costs per Facility
10	0	4	4	$31,000 to $65,000	$3,100 to $6,500
8	0	12	12	$75,000 to $155,000	$9,400 to $19,400
8	0	4 to 12 *	4 to 12	$25,000 to $155,000	$3,100 to $19,400
10	0.2 **	4	3.8	$30,000 to $61,000	$3,000 to $6,100
1	0.2 **	12	11.8	$9,000 to $19,000	$9,200 to $19,100
4	0.2 **	4 to 12 *	3.8 to 11.8	$12,000 to $76,000	$3,000 to $19,100
3	0.4 **	4	3.6	$8,000 to $17,000	$2,800 to $5,800
1	0.5 **	4	3.5	$3,000 to $6,000	$2,700 to $5,700
76	1	4	3	$178,000 to $369,000	$2,300 to $4,900
12	1	12	11	$103,000 to $213,000	$8,600 to $17,800
12	1	4 to 12 *	3 to 11	$28,000 to $213,000	$2,300 to $17,800
16	2	4	2	$25,000 to $52,000	$1,600 to $3,200
4	2	12	10	$31,000 to $65,000	$7,800 to $16,200
2	2	4 to 12 *	2 to 10	$3,000 to $32,000	$1,600 to $16,200
22	4	4	0	$0 to $0	$0 to $0
27	4	12	8	$169,000 to $349,000	$6,200 to $12,900
3	6	12	6	$14,000 to $29,000	$4,700 to $9,700
6	12	4	-8	$-37,000 to $-78,000	$-6,200 to $-12,900
30	12	12	0	$0 to $0	$0 to $0

Note: Costs are rounded and may not sum.

* Insufficient information to assign a monitoring frequency under the Provisions. Costs reflect the potential range of monitoring frequencies likely to be assigned (i.e., quarterly to monthly).

** Values less than one indicate monitoring frequencies over a five-year permit term that are less than once per year. 0.2 is a single test per permit term. 0.4 is two tests per permit term. 0.5 is one test every other year, or five tests over two permit terms.

Table 9-5. Summary of Changes of Chronic Routine Monitoring Costs for Non-Storm Water NPDES Dischargers, Marine Species

Number of Facilities	Current Annual Frequency	Proposed Annual Frequency	Change in Annual Test Frequency	Range of Change in Annual Monitoring Costs	Average Change in Annual Monitoring Costs per Facility
1	0.2 **	4 to 12 *	3.8 to 11.8	$4,000 to $29,000	$4,100 - $29,000
1	0.5 **	4	3.5	$4,000 to $9,000	$3,700 to $8,600
1	0.5 **	4 to 12 *	3.5 to 11.5	$4,000 to $28,000	$3,700 to $28,200
18	1	4	3	$58,000 to $133,000	$3,200 to $7,400
2	1	12	11	$24,000 to $54,000	$11,800 to $27,000
8	1	4 to 12 *	3 to 11	$26,000 to $216,000	$3,200 to $27,000
7	2	4	2	$15,000 to $34,000	$2,100 to $4,900
5	2	12	10	$54,000 to $123,000	$10,700 to $24,500
5	2	4 to 12 *	2 to 10	$11,000 to $123,000	$2,100 to $24,500
6	4	4	0	$0 to $0	$0 to$0
14	4	12	8	$120,000 to $275,000	$8,600 to $19,600
2	12	12	0	$0 to $0	$0 to $0

Note: Costs are rounded and may not sum.

* Insufficient information to assign a monitoring frequency under the Provisions. Costs reflect the potential range of monitoring frequencies likely to be assigned (i.e., quarterly to monthly).

** Values less than one indicate monitoring frequencies over a five-year permit term that are less than once per year. 0.2 is a single test per permit term. 0.5 is one test every other year, or five tests over two permit terms.

9.1.4.2.2 Laboratory Survey of Monitoring Costs

As discussed in Appendix K, State Water Board staff surveyed 23 ELAP-accredited laboratories that conduct multiple-concentration chronic aquatic toxicity tests for dischargers in California. Six of the 20 laboratories that responded to the survey provided cost information regarding typically charges for conducting aquatic toxicity tests. Three of the laboratories were commercial laboratories and three were municipal laboratories. However, one of the municipal laboratories currently contracts with another laboratory for their toxicity tests and reported the costs that they are charged by their contracted laboratory. Therefore, their cost information is included with the commercial laboratories.

Costs for the chronic toxicity tests reported by surveyed laboratories were compared with the laboratory testing unit costs published in the 2020 Economic Report. The 2020 Economic Report only used prices from commercial laboratories. The chronic test methods directly comparable between the two sources were for *C. dubia* (water flea), *Pimephales promelas* (fathead minnow), *Selenastrum capricornutum* (green alga), *Macrocystis pyrifera* (giant kelp), and *Atherinops affinis* (topsmelt)

As shown in Table 9-6, ten out of the twelve commercial laboratory prices reported in the survey were within the range of prices from the 2020 Economic Report. The remaining two commercial laboratory prices from the survey exceeded the price range from the 2020 Economic Report. The price of the *P. promelas* test reported by Laboratory B was about seven percent higher than the highest estimated cost for that test in the 2020 Economic Report. The *A. affinis* test reported by Laboratory D was about 17 percent higher than the highest estimated cost for that test in the 2020 Economic Report.

The municipal laboratory costs were universally higher than the commercial laboratory prices and the costs included in the 2020 Economic Report, as shown in Table 9-7. The municipal laboratories did not provide a breakdown of their costs to show what expenses lead to these higher costs.

The laboratory survey indicated that there may be other potential costs to consider. One laboratory in the survey mentioned that additional costs may be incurred to hire additional staff or to pay staff to work on the weekends or holidays to sample or conduct laboratory analyses in order to ensure that MMEL compliance tests are initiated within a calendar month. Other laboratories indicated that for toxicity tests that are cancelled or no longer needed, laboratories charge for incurred expenses (e.g., cost of purchasing test organisms, courier fees, etc.) and may charge a prorated fee based on the time and effort the laboratory expended.

Table 9-6. Commercial Laboratory Prices from Survey and 2020 Economic Report

Laboratory Code	Test Species	2019 Survey Reported Prices	2020 Economic Report Price Range	Within Range?
B	*C. dubia*	$1,500	$1,195 to $1,617	Yes
B	*P. promelas*	$1,500	$1,338 to $1,394	No, above range
C	*C. dubia*	$1,440	$1,195 to $1,617	Yes
C	*S. capricornutum*	$885	$781 to $1,394	Yes
D	*C. dubia*	$1,350	$1,195 to $1,617	Yes
D	*P. promelas*	$1,350	$1,338 to $1,394	Yes
D	*S. capricornutum*	$850	$781 to $1,394	Yes
D	*A. affinis*	$1,900	$1,193 to $1,617	No, above range
E	*C. dubia*	$1,262	$1,195 to $1,617	Yes
E	*P. promelas*	$1,397	$1,338 to $1,394	Yes
E	*S. capricornutum*	$1,020	$781 to $1,394	Yes

Table 9-7. Municipal Laboratory Prices from Survey and 2020 Economic Report

Laboratory Code	Test Species	2019 Survey Reported Prices	2020 Economic Report Price Range	Within Range?
A	*C. dubia*	$3,033	$1,195 to $1,617	No, above range
A	*P. promelas*	$3,268	$1,338 to $1,394	No, above range
A	*S. capricornutum*	$2,333	$781 to $1,394	No, above range
F	*C. dubia*	$3,283	$1,195 to $1,617	No, above range
F	*P. promelas*	$2,347	$1,338 to $1,394	No, above range

Laboratory Code	Test Species	2019 Survey Reported Prices	2020 Economic Report Price Range	Within Range?
F	*M. pyrifera*	$2,172	$1,338 to $2,064	No, above range
F	*S. capricornutum*	$2,130	$781 to $1,394	No, above range
F	*A. affinis*	$3,509	$1,193 to $1,617	No, above range

9.1.4.1.3.3 Costs of Adding Replicates

When using the TST approach, dischargers have an incentive to produce quality toxicity test data with low within-test variability. By adding additional replicates to toxicity tests, dischargers can reduce within-test variability and improve test power, and therefore potentially reduce the probability of fails when using the TST. Dischargers are not required to add replicates above the minimum required by the test methods, but they may choose to do so.

PG Environmental surveyed multiple ELAP-accredited laboratories and collected prices of adding either one or two replicates to some chronic test methods. PG Environmental found average costs of adding one replicate to an individual test to be from $56 to $112, and for two replicates, from $141 to $225 (PG Environmental, p. 4-14).

9.1.4.1.4 Species Sensitivity Screening Costs

The 2020 Economic Report estimated the costs of conducting a species sensitivity screening per the requirements of the Provisions. In the 2020 Economic Report, PG Environmental used average values of a three-species screening tests and used both single-concentration and multiple-concentration versions of the test. Under the assumption that four sets of species sensitivity screening tests would be conducted in the first year of every other permit term, the estimated increase in statewide costs for all facilities combined would be from $256,000 to $516,000 annually, where the minimum and maximum values of the range were for single and multiple concentration versions of the tests, respectively. (PG Environmental, p. 6-6).

Section 5.4.1 of this Staff Report points out that many non-storm water NPDES dischargers are already required to conduct species sensitivity screening at some frequency. The anticipated increase in costs to individual dischargers depends on how frequently the discharger is currently required to conduct species sensitivity screening and how many sets of tests are currently required for a species sensitivity screening. In addition, the Provisions allow Regional Water Boards discretion to require a species sensitivity screening upon each issuance, reissuance, renewal, or reopening (if the permit reopening is to address toxicity requirements), or to allow up to 15 years before a new species sensitivity screening is required. Costs to dischargers will depend on how often the Regional Water Boards require them to conduct species sensitivity screening. One objective of species sensitivity screening is to allow dischargers to use a single most sensitive species for each routine monitoring event, rather than having to use three species. Using a single species for routine monitoring is less costly than using three separate species for routine monitoring.

9.1.4.1.5 Toxicity Reduction Evaluation Costs

Examples of potential costs to develop and execute a TRE come from a variety of sources. The 2020 Economic Report reported costs from $28,000 to $45,000 (PG Environmental, p. 4-16). A comment letter from Bay Area Clean Water Agencies to the San Francisco Regional Water Board regarding NPDES Permit No. CA0038776 presented a table of TREs and TIEs that took place from 2009 through 2016. The reported prices were from $60,000 to $250,000 per TRE (Williams 2017, p. 7). All facilities for which TRE prices were reported had a design flow of over 5 MGD.

9.1.4.1.6 Costs Associated with Treatment Controls

The 2020 Economic Report concluded that "it is unlikely that a significant number of dischargers, if any, would need to implement additional treatment controls under the Provisions that would not already be needed to meet existing toxicity permit requirements" (PG Environmental, p. 5-3). In addition, the type of treatment controls used to control toxicity in effluent are highly variable. Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, and therefore toxicity controls are not considered to be reasonably foreseeable methods of compliance, this information is included for purposes of informing decision makers and the public of any possible effects that may result from the Provisions, however unlikely. Many of these possible toxicity controls are discussed in Chapter 6 of the Staff Report and include pretreatment controls that prevent toxicants in the influent, process controls that improve the efficiency of existing control measures, and facility upgrades. Because it is unlikely and speculative that dischargers may need to implement additional treatment controls under the Provisions, the economic report did not include an analysis of potential costs associated with potential controls for aquatic toxicity.

Even though the possibility that any given discharger would choose to implement a specific toxicity control as a method of complying with the Provisions is a speculative possibility, for purposes of informing decision makers and the public, a discussion on the costs of projects that include upgrading a wastewater treatment facility to tertiary treatment and advanced treatment is discussed below.

In the Economic Analysis (Appendix R) of Proposed Water Quality Objectives for Mercury in the State of California, Abt Associates considered the cost of upgrading a wastewater treatment facility from secondary to tertiary treatment. The analysis specifically considered the costs associated with addition of four different types of filters that would improve the water treatment process and remove additional toxicants from effluent. The types of filters considered in the analysis are deep bed granular media filters, clothe media filters, high-rate disk filters, and compressible synthetic media filters. (SWRCB 2017, p. R-47). These types of filters were considered because of their effectiveness in removing mercury from water. Other filters may be more appropriate for other types of toxicants.

The analysis considered costs in terms of 2016 dollar values. The analysis estimated that the capital unit costs for installing these types of upgrades are between $0.89 and $1.41 per gallon per day of authorized discharge. The analysis also estimated that ongoing operation and maintenance costs for these types of upgrades would cost between $50.18 and $78.61 per million gallons of water treated. (ibid.)

The costs of treatment described above, however, were part of an economic analysis specific to treatment of mercury and methylmercury. Because toxicity may be induced by any toxicant or combination of toxicants, it is possible that any facility upgrade that improves effluent quality could reduce toxicity, even if the upgrade was not initiated to address recurring episodes of toxicity. It is therefore speculative to attempt to determine which changes to wastewater treatment might be used to address toxicity in the future.

Information regarding the costs to dischargers for upgrades that addressed only toxicity, as opposed to specific toxicants, was not available. However, it is informative to provide examples of the costs of facility upgrade projects in general. Table 9-8 below is a summary of projects that have been financed at least in part by funding from the State Water Board Clean Water State Revolving Fund as presented in the *2018 Annual Report for the Clean Water State Water Revolving Fund and the Water Quality, Supply, and Infrastructure Improvement Act of 2014* (SWRCB 2018).

Table 9-8 Wastewater Treatment Projects Funded Through the Clean Water State Revolving Fund as of July 2018.

Recipient and Facility	Funding Amount as of 6/30/2018	Project Description	Population Served by the Project
Carlsbad Municipal Water District	$22,150,000	Wastewater recycling capacity expansion	73,700
Corona, City of	$11,133,592	Facility improvements and upgrades to tertiary treatment	164,226
Davis, City of	$81,057,000	Facility improvements and upgrades to tertiary treatment	67,850
Davis, City of	$35,500,000	Drinking Water System Improvements	67,850

Recipient and Facility	Funding Amount as of 6/30/2018	Project Description	Population Served by the Project
Dixon, City of	$28,093,094	Replacement of or upgrades to existing systems	17,000
Eastern Municipal Water District	$47,632,440	Expansion of recycled water system	804,000
Fallbrook Public Utilities District, Multiple	$28,723,000	Facility rehabilitation and expansion	Unknown
Fresno, City of	$37,475,049	Recycled water conveyance construction	460,000
Fresno; City of	$33,138,638	Tertiary treatment capacity increase	460,000
Galt, City of	$24,638,094	Existing treatment capacity increase	25,450
Hi-Desert Water District, Town of Yucca	$142,349,314	Construction of new wastewater treatment facility	19,594
Hillsborough, Town of	$10,172,759	Sewer pipeline upgrades	Unknown
Inland Empire Utilities Agency	$24,645,000	Construction of new laboratory/office facility	875,000
Los Angeles CSD District No. 2	$41,510,796	Construction of new pumping plant	698,296
McKinleyville CSD	$15,569,506	Replacement of and upgrades to existing systems	16,900
Modesto, City of	$41,862,028	Construct recycled water delivery system	210,000

Recipient and Facility	Funding Amount as of 6/30/2018	Project Description	Population Served by the Project
Modesto, City of; Jennings Secondary/Tertiary Treatment Facility	$124,829,278	Upgrades to tertiary treatment	210,000
Palm Springs, City of	$29,917,266	Replacement of and upgrades to existing systems	45,000
Padre Dam Municipal Water District	$101,200,000	Recycled water capacity increase	100,500
Palo Alto, City of	$29,683,900	Construction of new solids/sludge handling system	Unknown
Pleasanton, City of	$11,317,177	Construction of recycled water production system	75,000
Sacramento Regional County Sanitation District, Echo Water Project Phase I	$41,828,976	Various upgrades	1,400,000
Sacramento Regional County Sanitation District, Echo Water Project Phase 2	$138,672,372	Improvement of existing wastewater storage	1,400,000
Sacramento Regional County Sanitation District, Echo Water Project Phase 3	$2,861,737	Plant electrical system upgrades	1,400,000
Sacramento Regional County Sanitation District, Echo Water Project Phase 4	$21,465,759	Construction of advanced tertiary disinfection system	1,400,000

Recipient and Facility	Funding Amount as of 6/30/2018	Project Description	Population Served by the Project
Sacramento Regional County Sanitation District, Echo Water Project Phase 5	$53,490,845	Upgrade to advanced treatment system	1,400,000
Sacramento Regional County Sanitation District, Echo Water Project Phase 6	$533,142,603	Upgrade to advanced treatment system	1,400,000
Sacramento Regional County Sanitation District, Echo Water Project Phase 7	$35,696,952	Upgrade to advanced treatment system	1,400,000
Sacramento Regional County Sanitation District, Echo Water Project Phase 8	$564,657,506	Upgrade to tertiary treatment system	1,400,000
San Diego, City of; Metropolitan Biosolids Center	$7,203,499	Construction of Chemical Storage	2,200,000
San Diego, City of; Metro Biosolids Center	$12,000,000	Replacement of or upgrades to facility machinery	2,200,000
Santa Barbara; City of	$31,388,033	Upgrade of secondary treatment systems	Unknown
Santa Margarita Water District	$76,315,000	Expansion of water storage	120,000
South Coast Water District	$102,560,000	Refurbishment of conveyance system	40,000
Sunnyvale, City of	$127,068,522	Construction of new primary treatment	148,372

Recipient and Facility	Funding Amount as of 6/30/2018	Project Description	Population Served by the Project
The City & County of San Francisco Public Utilities Commission	$34,445,778	Upgrades to primary and secondary treatment systems	864,816
The City & County of San Francisco Public Utilities Commission	$40,006,740	Upgrades to disinfection system	864,816
The City & County of San Francisco Public Utilities Commission	$171,220,000	Construction of recycled water production and delivery systems	864,816
Union Sanitary District, Thickener Control Building	$12,200,00	Efficiency Upgrades	347,009
Victor Valley Wastewater Reclamation Authority, Apple Valley Subregional WRP	$26,088,996	Construction of new wastewater reclamation plant	70,000
Victor Valley Wastewater Reclamation Authority, Hisperia Subregional WRP	$37,180,580	Construction of new wastewater reclamation plant	317,000
Visalia, City of; Visalia Waste Water Treatment Plant	$92,580,432	Construction of new recycled water production capacity	136,000
Vista, City of; Vista/Carlsbad Sewer Interceptor System	$21,991,869	Sewer system replacement and expansion	96,929
West County Wastewater District	$21,100,763	Increase of recycled water production capacity	102,481

Recipient and Facility	Funding Amount as of 6/30/2018	Project Description	Population Served by the Project
West County Wastewater District	$14,593,521	Replacement or rehabilitation of existing systems	102,481
Western Municipal Water District	$24,000,000	Improvements to secondary treatment systems	20,972
Western Riverside County Regional Wastewater Authority	$72,620,000	Expansion of tertiary treatment system	140,000
Woodland, City of	$18,995,120	Energy efficiency upgrades	56,908
Woodland-Davis Clean Water Agency	$87,746,473	Changing domestic water source to improve wastewater selenium concentration	125,376

9.1.4.1.7 Funds Available for Facilities Serving Small Disadvantaged Communities

The State Water Board manages several programs authorized by the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Prop 1), including funding programs for small community wastewater, water recycling, drinking water, stormwater, and groundwater. These programs are administered through the State Water Board's Division of Financial Assistance, which is tasked with providing resources and funds for improving treatment at wastewater treatment facilities. Under Prop 1 programs, the Clean Water State Revolving Fund (CWSRF) financially supports eligible projects for small community wastewater treatment facilities. The criteria for financial assistance eligibility are described in detail in the CWSRF Intended Use Plan: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/docs/cwsrf_iup_sfy2020_21_final.pdf

Wastewater treatment facilities serving small disadvantaged communities may apply to receive financial assistance from the CWSRF grants and loans to help comply with the implementation requirements of the Toxicity Provisions.

Funding Sources Available from the CWSRF include:

- Capitalization Grant Projects

- Other CWSRF Loan Funds
- Principal Forgiveness (Cap Grant Funds Only)
- Water Recycling Funding Program Loan
- Water Recycling Funding Program Grant

Wastewater treatment facilities serving small disadvantaged communities may apply for grants and loans through one of the following application processes:

- Small Community Funding Program: HYPERLINK "https://www.waterboards.ca.gov/water_issues/programs/grants_loans/sustainable_water_solutions/scfp.html" \t "_blank" https://www.waterboards.ca.gov/water_issues/programs/grants_loans/sustainable_water_solutions/scfp.html
- Financial Assistance Program: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/srf_forms.html

The most recent information and additional resources can be found at the State Water Board's Division of Financial Assistance website at: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/

9.1.4.2 Storm Water and Nonpoint Source Dischargers

The only direct change to permit requirements for all nonpoint source and storm water dischargers that are required to monitor for toxicity with test methods specified in the Toxicity Provisions is the requirement to use the TST approach to analyze test data and report the results and the percent effect to the Water Boards. The 2020 Economic Report stated that "[T]here are no toxicity monitoring data from storm water dischargers from which to determine the change in compliance actions for storm water dischargers under the Provisions and thus, the incremental controls that may be needed under the Provisions." (PG Environmental, 2020. P. 4-22). However, the TST Test Drive completed in 2011 by the State Water Board evaluated storm water and ambient samples collected during dry weather, storm events, and irrigation seasons in agricultural areas and found that using the TST approach is not expected to result in a net change in outcomes compared to use of the current statistical approaches.

The 2020 Economic Report similarly determined that "Incremental compliance costs to storm water dischargers [and nonpoint source dischargers] associated with additional enforcement actions due to a change in statistical approach specified under the Provisions are unlikely based on the State Water Board (2011) comparison of toxicity results for storm water [and storm water runoff from agriculture areas] using the TST statistical approach and aquatic toxicity methods." (PG Environmental, p. 5-7.)

PG Environmental also noted that dischargers may "…decide to add replicates to samples to improve statistical power" and "…this may add anywhere from $60 to $225 per test", although doing so could reduce total costs (ibid.). For both nonpoint source and storm water, dischargers may choose to add replicates to samples. Abt Associates determined that dischargers may choose to add replicates to reduce the likelihood of accelerated monitoring and TREs. However, under the Provisions, storm water and nonpoint source dischargers are not required to conduct accelerated monitoring and TREs. While the replicates might be added to reduce within-test variability, the addition would not be a result of the Provisions.

Given that there are no anticipated changes in the frequency of sampling for storm water and nonpoint source dischargers, there is no expected change in costs due to field sample collection and transport.

9.1.5 The Need for Developing Housing

The adoption of the Provisions is not expected to constrain housing development in California. The implementation requirements do not directly affect the cost of housing, but can increase the cost of city utility services, mainly sewer. The costs associated with the requirements are anticipated to be minimal in comparison to the overall costs of housing development.

9.1.6 The Need to Develop and Use Recycled Water

The adoption of the Provisions is not expected to restrict the need to develop and use recycled water. The Provisions will not change any requirements for recycled waters. Therefore, the Provisions are consistent with the need to develop and use recycled water. The intent of the Provisions is to improve water quality and reduce aquatic toxicity in surface waters, including rivers, streams, estuaries, reservoirs, lakes and bays.

9.2 Considerations Required by Water Code Section 13242

California Water Code section 13242 requires that the program of implementation for achieving the water quality objective within the Provisions include a description of the nature of the actions which are necessary to achieve the objective, time schedules for actions to be taken, and a description of the surveillance to be undertaken to determine compliance with the water quality objective.

In compliance with California Water Code section 13242, the Provisions includes a program of implementation in order to achieve water quality objectives. A time schedule for compliance can be applied in NPDES permits, if needed, in accordance with the Compliance Schedule Policy (Resolution No. 2008-0025). Monitoring requirements and requirements on compliance determinations are included in the Provisions.

After the effective date of the Provisions, the requirements to implement the Provisions would be incorporated into permits and certifications as they are adopted, reissued, or modified. Most existing permits should have all applicable new toxicity requirements incorporated within five to ten years after the effective date of the Provisions. This is because NPDES permits expire every five years and the new requirements should be added to each permit at the time of their reissuance or renewal. However, in some cases, the permits can be administratively extended which results in a delay in reissuing the permits. For storm water and nonpoint source dischargers that have existing chronic or acute toxicity monitoring requirements with test methods described in III.B.2 (formerly Section IV.B.1.b), either a 13383 or a 13267 order would be issued within one year from the effective date of the provisions. The discharger would then have one year from the date of the order to implement the requirements of the Provisions. The Regional Water Boards are not required to include toxicity monitoring requirements in permits, WDRs, or waivers of WDRs for storm water and nonpoint source dischargers. If a Regional Water Board determines, at their discretion, to include such requirements for a storm water or nonpoint source discharger, such monitoring requirements, and the corresponding requirements in the Provisions could be incorporated at the time of permit, WDR, or waiver of WDR issuance, reissuance, or renewal.

9.3 Anti-backsliding

Clean Water Act section 402(o) prohibits reissuing or modifying a permit to include water quality based effluent limitations less stringent than those in the previous permit, unless certain exceptions are met. This prohibition is commonly known as the anti-backsliding rule. There are two sets of exceptions to the anti-backsliding rule for water quality based effluent limitations– one in Clean Water Act section 303(d)(4) and the other in section 402(o)(2).

The exceptions in section 303(d)(4) address both waters in attainment with water quality standards and those not in attainment (i.e., waters on the section 303(d) impaired waters list). For waters for which standards are attained, section 303(d)(4) allows less stringent effluent limitations when water quality standards are met, and such relaxation complies with antidegradation requirements. The permitting authority would determine on a case-by-case basis whether a lowering of water quality would be allowed. For waters for which standards are not attained, water quality based effluent limitations may be relaxed when the existing effluent limitation is based on a TMDL or other waste load allocation and the cumulative effect of such revisions assures attainment of the water quality standard. If there is no assurance that the water quality standards will be achieved, then no backsliding is allowed. In addition, for waters for which standards are not attained, an effluent limitation may be relaxed when the designated use is removed.

Clean Water Act Section 402(o)(2) contains six specific exceptions to the prohibition on backsliding, including, but not limited to, material and substantial alteration to the permitting facility or new information which justify the application of a less stringent limitation.

Typically, it is the permitting authority at the time of revising or modifying the permit that would determine if anti-backsliding principles apply. However, the State Water Board is requiring the permitting authority to include specific effluent limitations into NPDES permits for non-storm water NPDES dischargers. Therefore, the State Water Board includes an analysis of anti-backsliding principles in this Staff Report. The State Water Board does not anticipate a relaxation of existing water quality based effluent limitations in non-storm water NPDES dischargers permits as a result of incorporating the effluent limitations in the Provisions in most cases, as described below. In all cases, however, the permitting authority will be required to conduct a permit-specific anti-backsliding analysis at the time of permit reissuance or reopening. If the permitting authority determines that a relaxation of existing effluent limitations would occur and an exception does not apply, the permitting authority would not include the applicable effluent limitation specified in the Toxicity Provisions, and would instead include the effluent limitation necessary to comply with federal law.

Chronic Toxicity

The current non-storm water NPDES permits issued by the North Coast, Central Coast, Colorado River, Central Valley, Lahontan, and Santa Ana Region Water Boards include chronic toxicity triggers, which require the discharger to conduct accelerated monitoring tests, which could then lead to a TRE. The triggers are not numeric effluent limitations and the permit does not define what constitutes a violation. For a permit containing numeric triggers, there would not be a relaxation of effluent limitations.

In both the Provisions and in San Diego Region and Los Angeles Region non-storm water NPDES permits, the chronic toxicity MMEL is based on the pass/fail results for the median of three chronic toxicity tests conducted in a calendar month and analyzed using the TST approach. The MDEL in these non-storm water NPDES permits and the Provisions are similar, since they are both based on a fail and a 50 percent effect. The difference is that the Provisions use a 50 percent effect for the lethal endpoint, when the test has a lethal endpoint, while the MDEL in the permits uses a 50 percent effect threshold for any endpoint. These effluent limitations are similar to the effluent limitations required in the Provisions with slight variation.

On balance, no relaxation of water quality based effluent limitations in non-storm water NPDES dischargers permits is expected as a result of incorporating the effluent limitations in the Provisions. The Provisions would require a species sensitivity screening and use of the most sensitive species when determining compliance with the effluent limitations, thereby ensuring protection of aquatic life beneficial uses. In some circumstances, dischargers would have to increases monitoring frequency. Taking into consideration use of the most sensitive species and a possible increase in monitoring, there would not be a relaxation of effluent limitations.

For permits issued, reissued, reopened, or renewed after the effective provisions but before December 31, 2023, no relaxation of water quality based effluent limitations is expected in most scenarios. However, a relaxation could possibly occur when a current permit includes an MMEL using *C. dubia* as the most sensitive species and the reissuance includes a MMEL using *Pimephales promelas* (fathead minnow) or *Selenastrum capricornutum* (green alga) as the most sensitive species until December 31, 2023 (scenario 3, option B). If the permitting authority determines that there is a relaxation of effluent limitations, the State Water Board anticipates that an exception to the anti-backsliding prohibition would apply. As explained in section 5.4.3, whenever the permitting authority determines an MMEL using *C. dubia* must be included in the NPDES permit to comply with federal law, the Permitting Authority shall include the MMEL using *C. dubia* as the most sensitive species (Option A) in the NPDES permit.

The only other identified case where the effluent limitations of the Provisions may arguably be less stringent than existing requirements is in the San Diego Region. The MDEL in one of the non- storm water NPDES permits in the San Diego Region is a fail for any chronic toxicity test conducted at the IWC, regardless of the percent effect. If the permitting authority determines that there is a relaxation of effluent limitations, the State Water Board anticipates that an exception to the anti-backsliding prohibition would apply.

The AMELs and the MDELs in non-storm water NPDES permits in the San Francisco Region were derived from a criterion of 1 TUc prior to applying dilution credit. When dilution is available, the resulting AMEL is at a slightly higher concentration of effluent than the IWC. The MDELs in the reviewed San Francisco Regional Water Board permits are based on a lower concentration of effluent and are exceeded whenever a single test exceeds that limit. As discussed in Chapter 5, looking only at the use of different concentrations, it is unknown if the MDELs and AMELs in these permits are more or less stringent than the MDEL and MMEL in the Provisions. Although difficult to compare the stringency of the effluent limitations when different concentrations are used in each, on balance, no relaxation of water quality based effluent limitations in non-storm water NPDES dischargers permits is expected as a result of incorporating the effluent limitations in the Provisions. The Provisions would require use of the TST in determining compliance with the MDEL and MMEL, which provides three critical improvements: 1) the incorporation of regulatory management decisions (RMDs) and individual test method-specific error values that clearly define what effect level is considered toxic; 2) restatement of the null and alternative hypotheses so that dischargers are required to demonstrate that their effluent is not toxic; and 3) the incorporation of both false positive and false negative error rates, providing high confidence in the outcome for each result. Taking into consideration a possible increase in monitoring and use of the TST, there would not be a relaxation of effluent limitations.

Acute Toxicity

Most of the numeric acute toxicity effluent limitations in the permits that were reviewed require discharges to meet both a longer-term 90 percent survival threshold and a short-term 70 percent survival threshold. The 90 percent thresholds are typically a median of three consecutive tests and the 70 percent threshold is typically expressed as a single sample maximum in the permits that were reviewed. However, some permits in the San Francisco Region express these limits over a larger number of samples. These effluent limitations in the permits are calculated as a percent survival, without the use of a statistical approach to assess the variability of the data. Because these effluent limitations do not contain a statistic, they do not account for variation. In contrast the Provisions use the TST approach, which is a clear statistical approach that accounts for variation and provides statistical confidence in the outcomes. As such, the State Water Board does not anticipate a relaxation of water quality based effluent limitations in non-storm water NPDES dischargers permits as result of incorporating the effluent limitations.

Some of the permits that were reviewed contained numeric triggers, which were generally based on the percent survival, but did not contain numeric effluent limitations. For permits containing numeric triggers, there would not be a relaxation of effluent limitations.

9.4 Antidegradation

In 1968, the State Water Board adopted California's antidegradation policy by Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," which applies to surface and groundwater whose quality meets or exceeds water quality objectives and establishes the intent to maintain high quality waters of the state to the maximum extent possible. Whenever existing water quality is better than the quality established in applicable policies or plans, Resolution No. 68-16 provides that the high water quality must be maintained unless it can be demonstrated that any change in water quality will (1) be consistent with the maximum benefit to the people of the state, (2) not unreasonably affect present and anticipated beneficial uses of such water, and (3) not result in water quality less than that prescribed in applicable water quality control policies or plans. Further, any activity that results in a discharge to high quality waters must use the best practicable treatment or control necessary to avoid a pollution or nuisance and to maintain the highest water quality consistent with the maximum benefit to the people of the state.

The federal antidegradation policy, established in 1975, applies to surface water, regardless of the quality of the water. (40 CFR § 131.12.) Under the federal policy, "existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." (40 CFR § 131.12(a)(1).) In addition, where the quality of waters exceeds levels necessary to support the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality of water must be maintained and protected unless the state finds that (1) allowing lower quality is necessary to accommodate important economic or social development in the area in which the waters are located; (2) water quality is adequate to protect existing beneficial uses fully; and (3) the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control are achieved. (40 CFR § 131.12(a)(2).) The State Water Board has interpreted Resolution No. 68-16 to incorporate the federal policy where the federal policy applies under federal law.

The State Water Board does not anticipate any degradation of water quality as a result of the adoption and implementation of the Provisions. The Provisions are intended to enhance water quality. The establishment of numeric toxicity water quality objectives would protect aquatic life beneficial uses, including but not limited to, WARM, COLD, WILD, EST, RARE, MIGR, SPWN, MAR, SAL, and WET. The Provisions would not supersede narrative toxicity objectives. The narrative toxicity objective could continue to be used to derive chemical-specific limits and receiving water limitations. As discussed in Chapter 5 of this Staff Report, the proposed numeric water quality objectives for chronic and acute aquatic toxicity will provide a more consistent assessment of toxicity in ambient surface waters with greater confidence in the results because numeric water quality objectives provide clear RMDs for unacceptable toxicity.

The number of waterbodies determined to be impaired for toxicity is also likely to remain about the same using the TST approach or other current statistical approaches. However, assessment using numeric water quality objectives and the TST approach may identify toxicity in different waterbodies than other current statistical approaches. This identification would not be indicative of degradation caused by the Provisions, but rather a change in assessment that provides more confidence in and consistent interpretation of results. Since the implementation requirements in the Provisions would not supersede the implementation program of adopted toxicity TMDLs, the Provisions could not result in a degradation of water quality standards in waters where toxicity TMDLs have been established.

The Provisions do not themselves authorize the degradation of any high-quality waters. They instead establish water quality objectives and a program of implementation designed to achieve those water quality objectives. Any degradation that would occur as an indirect result of the Provisions would occur when the State Board or Regional Board prescribes or modifies WDRs (including NPDES Permits), issues conditional waivers, or issues water quality certifications that authorize waste discharges to inland surface waters, enclosed bays, and estuaries. Any changes to the allowable discharge that are not related to implementation of the Provisions (e.g., increase in authorized discharge amount) are beyond the scope of this project, and are not analyzed in this Staff Report. The State Water Board does not anticipate any degradation of water quality as an indirect result of the requirements being prescribed in WDRs or other orders. The Provisions include a program of implementation that is designed to achieve the numeric water quality objectives. For non-stormwater NPDES dischargers, the Provisions include requirements for determining reasonable potential. Because the Provisions provide clear thresholds for establishing when a reasonable potential exists and requires that the Regional Water Boards use all aquatic toxicity test data generated within five years prior to permit issuance, reissuance, renewal, or reopening to evaluate if the discharger has exceeded those thresholds for establishing reasonable potential, the Provisions will likely lead to an increase in the number of non-storm water NPDES dischargers that are required to conduct routine monitoring for chronic and/or acute toxicity and comply with toxicity effluent limitations. As discussed in the anti-backsliding section above, the effluent limitations in the Provisions are not less stringent than existing requirements in most instances. An increase in monitoring frequency may result in an increased likelihood of detecting toxicity when it occurs, as more samples would be taken and analyzed throughout the year. Routine monitoring, compliance with effluent limitations, and possible TREs, will ensure that dischargers take necessary steps to identify and address toxicity in effluent. This would have the benefit of improving water quality. Furthermore, the permitting authority is already obligated to determine on a permit-by-permit basis whether degradation would occur as a result of the permit, whether an antidegradation analysis is required, and if the permit is consistent with state and federal law, including antidegradation policies, at the time of issuing, reissuing, renewing, or reopening a permit.

As discussed in Chapter 5, the requirement to include the MMEL indicated in Section III.C.5.d (formerly Section IV.B.2.e.iv) using *C. dubia* as the MOST SENSITIVE SPECIES shall take effect on a statewide basis starting January 1, 2024. The permitting authority would still be required to include the MMEL using *C. dubia* whenever necessary to comply with federal law. Similarly, there may be instances in which the permitting authority concludes that a receiving water limitation based on the numeric water quality objective is required by federal law. Between the effective date and January 1, 2024, only a small number of NPDES permits are expected to be issued, reissued, renewed, or reopened (to address toxicity requirements), and of those, only some will identify *C. dubia* as the most sensitive species. Any adverse changes to water quality that would result from those permits not applying an MMEL using *C. dubia* before January 1, 2024, are unlikely. In no case is the change expected to adversely affect existing beneficial uses. As discussed in Chapter 5, if there are any adverse changes, they are expected to be minor because (1) monitoring using *C. dubia* would still be required and the sensitivity of the species would still be used to determine chronic toxicity of the effluent and whether a TRE should be conducted, and (2) lower treatment performance, lower effluent quality, or higher effluent volumes for individual treatment plants as a result of a delay in imposing the *C. dubia* MMEL is also not reasonably expected. Therefore, in totality, no adverse changes in water quality are expected as a result from the delayed implementation of the *C. dubia* MMEL. If there are any adverse changes, those changes would be minor and limited in duration.

If there is a minor and limited in duration change in water quality due to the Toxicity Provisions, that change is consistent with the maximum benefit of the people of the state. It is appropriate, and in the maximum benefit of the people of the state to include a short-term delay in the statewide implementation of the *C. dubia* MMEL, as long as it is consistent with federal law for each permit, due to the need to build stakeholder and public confidence in the ability of laboratories to perform well when conducting the chronic *C. dubia* test method for MMEL compliance purposes. The alternative (requiring the use of the chronic *C. dubia* test for MMEL compliance purposes on a statewide basis without a delay until January 1, 2024) would not be in the best interest of the people of the state because it could exacerbate the lack of public confidence in the MMEL compliance determinations. The delayed application of the *C. dubia* MMEL to January 1, 2024, is not an authorization for the discharger to change its treatment system. This combined with the other incentives described in Chapter 5 will ensure that the change in water quality does not unreasonably affect present and anticipated beneficial uses of such water, and not result in water quality less than that prescribed in applicable water quality control policies or plans. Monitoring and TRE will ensure that the discharger uses the best practicable treatment or control necessary to avoid a pollution or nuisance and to maintain the highest water quality consistent with the maximum benefit to the people of the state. Because the foregoing analysis is necessarily general and programmatic in nature, the Toxicity Provisions specify that the permitting authority must confirm that delaying the use of the chronic *C. dubia* test for MMEL compliance purposes is consistent with federal law (including antidegradation requirements) on a permit-by-permit basis for any permit that is issued, reissued, renewed, or reopened (if the permit reopening is to address toxicity requirements) prior to January 1, 2024.

9.5 The Human Right to Water

California Assembly Bill 685 (AB 685) declares that “every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes” (Wat. Cod, § 106.3, subd. (a)) and promotes the adoption of policies, regulations, and grant criteria pertinent to those uses of water (ibid., § 106.3, subd. (c)). State Water Board Resolution 2016-0010 adopts the human right to water as a core value, adopts the realization of the human right to water as a top priority for the Water Boards, and directs staff, when submitting a recommendation to the board pertinent to the human right to water, to describe how the right was considered.

The Provisions do not directly pertain to drinking water. The main goal of the Provisions is to protect aquatic life, and the implementation methods to achieve this goal focus on reducing toxicity in effluent that is discharged into surface waters. The Provisions may indirectly increase accessibility of safe clean drinking water because a reduction in toxic substances from discharges into surface waters would provide higher quality source waters for drinking water intakes. For example, the treatment that removes toxicity in wastewater treatment plants (settling, flocculation, and filtration) tends to also remove other constituents that may be a concern for drinking water, such as sediments, nutrients, and bacteria. Many wastewater treatment plants discharge the effluent indirectly upstream of drinking water intake structures.

Surface water that is used for drinking is usually treated before it is distributed to residents and businesses to remove pathogens and sediments. If sediments and pathogens are lower in surface water to begin with, it is easier to provide safe, clean drinking water.

The Provisions may also indirectly decrease accessibility of safe, clean drinking water by increasing the costs for residential customers for the water in their home. This could happen because the Provisions would impose new requirements for wastewater treatment plants. In response, plants may need to perform toxicity minimization programs and activities, or possibly add new treatment steps. The increased costs to wastewater treatment plants may be passed on to the customers. Since the municipal water and sewer service are combined in many areas, this could indirectly increase the cost of drinking water.

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Appendix A. Abbreviations

AB	Assembly Bill
AMEL	Average monthly effluent limitation
AML	Average monthly limits
ARB	California Air Resources Board
Basin Plan	Regional Water Quality Control Plan
BMPs	Best management practices
BOD	Biological oxygen demand
Cal. Code of Regs	California Code of Regulations
California Ocean Plan	The Water Quality Control Plan for Ocean Waters of California
CASQA	California Stormwater Quality Association
Caltrans	California Department of Transportation
Caltrans MS4 Permit	Statewide Storm Water Permit Waste Discharge Requirements for State of California Department of Transportation
CEC	California Energy Commission
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	Construction General Permit, also known as the General Permit for Discharges of Storm Water Associated with Construction Activity
CTR	California Toxics Rule
Clean Water Act	Federal Water Pollution Control Act
CWSRF	Clean Water State Revolving Fund
DTSC	Department of Toxic Substances Control
DWQ	Division of Water Quality
EC	Effect concentration
EIR	Environmental Impact Report
ELAP	Environmental Laboratory Accreditation Program
GAC	Granulated activated carbon
IC	Inhibition concentration
IGP	Industrial General Permit, also known as the Statewide General Permit for Storm Water Discharges Associated with Industrial Activities
ILRP	Irrigated Lands Regulatory Program
ISWEBE Plan	The Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries

IWC	Instream waste concentration
LA	Load allocation
LC	Lethal concentration
LOEC	Lowest observed effect concentration
MDEL	Maximum daily effluent limitation
MGD	Million gallons per day
MDL	Maximum daily limitation
MHI	Median household income
MMEL	Median monthly effluent limitation
MS4	Municipal separate storm sewer system
NAL	Numeric action level
ND	Non-detect
NOAEC	No observed adverse effect concentration
NOEC	No observed effect concentration
NPDES	National pollutant discharge elimination system
NPS	Nonpoint source
NTR	National Toxics Rule
OAL	Office of Administrative Law
O/M	Operations and maintenance
PAC	Powdered activated carbon
PMSD	Percent minimum significant difference
POTW	Publicly owned treatment works
Regional Water Board	Regional Water Quality Control Board
RMD	Regulatory management decision
RMPs	Regional monitoring programs
SED	Substitute Environmental Documentation
SIP	Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy)
State Water Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Storm Water Pollution Prevention Plan
TAC	Test acceptability criteria
Technical Support Document	Technical Support Document for Water Quality-Based Toxics Control
TIE	Toxicity identification evaluation
TMDL	Total maximum daily load
Toxicity Training Tool	EPA Region 8, 9, and 10 Toxicity Training Tool
TRE	Toxicity reduction evaluation

TST	Test of Significant Toxicity
TST Technical Document	National Pollution Discharge Elimination System Test of Significant Toxicity Technical Document
TST Test Drive	Effluent, Storm water, and Ambient Toxicity Test Drive Analysis of the Test of Significant Toxicity
TU	Toxicity units
TU_a	Toxicity units—acute
TU_c	Toxicity units—chronic
U.S. EPA	United States Environmental Protection Agency
U.S.C	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
Wat. Code	California Water Code
Water Boards	The State Water Resources Control Board and the Regional Water Quality Control Boards
WDR	Waste discharge requirements
WET	Whole effluent toxicity
WLA	Waste load allocation
WWTP	Wastewater treatment plant

Appendix B. Glossary

Acute Aquatic Toxicity Test: A test to determine an adverse effect (usually lethality) on a group of aquatic test organisms during a short-term exposure (e.g. 24, 48, or 96 hours).

Average Monthly Limit (AML)/Average Monthly Effluent Limitation (AMEL): The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Chronic Aquatic Toxicity Test: A test to determine an adverse effect (sub-lethal or lethal) on a group of aquatic test organisms during an exposure of duration long enough to assess sub-lethal effects.

Coefficient of Variation (CV): A standard statistical measure of the relative variation of a distribution or set of data, defined as the standard deviation divided by the mean, (also referred to as the relative standard deviation).

Effect Concentration (EC): A point estimate of the toxicant concentration that would cause an observable adverse effect (e.g., death, immobilization, or serious incapacitation) in a given percentage of the test organisms, calculated from a continuous model (e.g., Probit).

Flow-Through Acute Toxicity Testing Systems: A toxicity testing system where an effluent sample is either pumped continuously from the sampling point directly to a dilutor system, or collected and placed in a tank adjacent to the test laboratory and pumped continuously from the tank to a dilutor system.

Hypothesis Testing: A statistical approach (e.g., Dunnett's test, t-test) used to determine whether a tested concentration results in a statistically different response from that observed in the control. The statistical endpoints derived from hypothesis testing are the no observed effect concentration (NOEC), lowest observed effect concentration (LOEC), no observed adverse effect concentration (NOAEC), and pass/fail.

Inhibition Concentration (IC): A point estimate of the toxicant concentration that would cause a given percent reduction in a sublethal, biological measurement of the test organisms, such as reproduction or growth.

Insignificant Discharges: NPDES discharges that are determined to be a very low threat to water quality by the PERMITTING AUTHORITY.

Instream Waste Concentration (IWC): The concentration of effluent in the receiving water after mixing as determined by the PERMITTING AUTHORITY. For purposes of aquatic toxicity testing for non-Storm water NPDES dischargers, the IWC shall be as described in Section III.C.1 (formerly Section IV.B.2.a) of the Provisions. For assessing whether receiving waters meets the numeric water quality objectives, the undiluted ambient water shall be used as the IWC in the TEST OF SIGNIFICANT TOXICITY (TST) as indicated in Section III.B.3 (formerly Section IV.B.1.c) of the Provisions.

Lethal Concentration (LC): The concentration of effluent or receiving water sample that causes death in a pre-determined percentage of test organisms over a specified period of time.

Lowest Observed Effect Concentration (LOEC): The lowest tested concentration of an effluent or receiving water sample that causes observable, adverse effect on the test organisms

Management Practice: Any program, process, siting criteria, operating method, measure or device which controls, prevents, removes, or reduces pollution. Optimal management practices are referred to as "best management practices."

Maximum Daily Limit (MDL)/Maximum Daily Effluent Limitation (MDEL): For the purposes of chronic and acute aquatic toxicity, an MDEL is an effluent limitation based on the outcome of the TEST OF SIGNIFICANT TOXICITY (TST) approach and the resulting PERCENT EFFECT at the IWC, as described in Sections III.C.5 and III.C.6 (formerly Sections IV.B.2.e and IV.B.2.f) of the Provisions.

Maximum Daily Effluent Target (MDET): For the purposes of chronic and acute aquatic toxicity, an MDET is a target used to determine whether a TRE should be conducted. Not meeting the MDET is not a violation of an effluent limitation.

Minimum Significant Difference (MSD): The measure of test sensitivity that establishes the minimum difference required between a control and a test treatment in order for that difference to be considered statistically significant.

Median Monthly Effluent Limitation (MMEL): For the purposes of chronic and acute aquatic toxicity, an MMEL is an effluent limitation based on a maximum of three independent toxicity tests, analyzed using the TST, as described in Sections III.C.5 and III.C.6 (formerly Sections IV.B.2.e and IV.B.2.f) of the Provisions.

Median Monthly Effluent Target (MMET): For the purposes of chronic and acute aquatic toxicity, an MMET is a target based on a maximum of three independent toxicity tests used to determine whether a TRE should be conducted. Not meeting the MMET is not a violation of an effluent limitation.

MMET Tests: For the purposes of chronic and acute aquatic toxicity, for dischargers not required to comply with numeric chronic toxicity effluent limitations, MMET Tests are a maximum of two tests that are used in addition to the routine monitoring test to determine whether a TRE should be conducted.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) designed or used for collecting or conveying storm water, which is not a combined sewer; and which is not part of a publicly owned treatment works.

Nonpoint Source (NPS): A source that does not meet the definition of a POINT SOURCE, as defined below.

No Observed Adverse Effect Concentration (NOAEC): A hypothesis test statistical endpoint expressing the highest concentration of effluent or receiving water sample at which the survival of the test organisms is not significantly different from that of the control.

No Observed Effect Concentration (NOEC): The highest tested concentration of an effluent or receiving water sample that causes no observable, adverse effect on the test organisms.

Non-NPDES Dischargers: Dischargers of waste that could affect the quality of waters of the state that are not regulated by the NPDES program.

Permitting Authority: The State Water Board or a Regional Water Board that issues a permit, waste discharge requirements, water quality certification, or other authorization for the discharge or proposed discharge of waste. To the extent that the action is delegable, the term "Permitting Authority" can include the Executive Officer of Executive Director.

Point Estimate: A statistical inference that estimates the true value of a parameter by computing a single value of a statistic from a set of sample data.

Publicly Owned Treatment Works (POTW): Facilities owned by a state or municipality that store, treat, recycle, and reclaim municipal sewage or industrial wastes of a liquid nature. Similar facilities that are privately, instead of publicly owned, are included in this definition for purposes of Section III (formerly Section IV.B) of the Provisions.

Reasonable Potential: A designation used for a waste discharge that is projected or calculated to cause or contribute to an instream excursion above a water quality standard.

Regulatory Management Decision (RMD): The decision that represents the maximum allowable error rates and thresholds for toxicity and non-toxicity that would result in an acceptable risk to AQUATIC LIFE.

Response: A measured biological change as a result of exposure to a stimulus.

Test of Significant Toxicity (TST): A statistical approach used to analyze toxicity test data. The TST incorporates a restated null hypothesis, Welch's t-test, and regulatory management decisions for chronic and acute toxicity.

Toxicity Identification Evaluation (TIE): Techniques used to identity the unexplained cause(s) of toxic event. A TIE generally involves selectively removing classes of chemicals through a series of sample manipulations, effectively reducing complex mixtures of chemicals in natural waters to simple components for analysis. Following each manipulation, the toxicity sample is assessed to see whether the toxicant class removed was responsible for the toxicity.

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, and then confirm the reduction in toxicity. A TIE may be required as part of the TRE, if appropriate.

Toxicity Units—acute (TU_a): A measure of toxicity that is 100 times the reciprocal of the effluent or receiving water concentration that causes 50 percent of the organisms to die in an acute toxicity test ($TU_a = 100/LC_{50}$). The larger the TU_a value, the greater the acute toxicity.

Toxicity Units—chronic (TU_c): A measure of toxicity that is 100 times the reciprocal of the effluent or receiving water concentration that causes no observable effect on the test organisms in a chronic toxicity test ($TU_c = 100/NOEC$ or $100/EC_{25}$). The larger the TU_c value, the greater the chronic toxicity.

Type I Error (α Error): The rejection of the null hypothesis (H_0) when it is, in fact, true.

Type II Error (β Error): The acceptance of the null hypothesis (H_0) when it is, in fact, not true.

Appendix C. Bioregions of California

C.1 Introduction

California contains a wide variety of bioregions, from desert environments below sea level, to coastal areas, to alpine areas of 14,000 feet or more in elevation. The diversity of geography in conjunction with variations in temperature and moisture leads to a significant diversity of biological resources. California has the highest total number of species and the highest number of endemic species within its borders as compared with any other state. California also has the highest number of rare species (species typically listed under the federal Endangered Species Act [ESA] or the California ESA), and about one-third of those species are at risk, meaning these species have the potential for local or global extinction.

California is divided geographically into bioregions (California Biodiversity Council, 2008), classified by relatively large areas of land or water, which contain characteristic, geographically distinct assemblages of natural communities and species. The biodiversity of flora, fauna, and ecosystems that characterize a bioregion tend to be distinct from that of other bioregions.

California is divided into 10 bioregions: Modoc, Klamath/North Coast, Sacramento Valley, Bay Area/Delta, Sierra, San Joaquin Valley, Central Coast, Mojave Desert, South Coast, and Colorado Desert (Figure C-1). While Appendix C refers to all bioregions in California, the Provisions would apply only to inland surface waters, enclosed bays, and estuaries in California that are subject to regulation under the state's Porter-Cologne Water Quality Control Act and the federal Clean Water Act. The Provisions would not apply to ocean waters and non-enclosed bays such as Monterey Bay and Santa Monica Bay.

Figure C-1. Bioregions of California

C.2 Modoc Bioregion (CERES 2011a)

The Modoc Bioregion, an area of stark contrast to the rest of the state, extends across California's northeast corner from Oregon to Nevada, and south to the southern border of Lassen County. From many vantage points, the view to the west is of forests and mountains, while the vista to the east is high desert characteristic of Nevada. Much of this sparsely populated bioregion consists of forests, mountains, high desert, valleys, piney woodlands, and volcanic remains in its natural state.

C.2.1 Location, Cities, and Population

Bounded by Oregon on the north and Nevada on the east, the Modoc bioregion extends westward across the Modoc Plateau, encompassing the Lassen and Modoc national forests. It includes all or part of seven counties: Modoc, and Lassen, and the eastern end of Shasta, Siskiyou and Tehama, northern edges of Butte and Plumas. Because bioregions have only fuzzy lines and can take in portions of several counties, it is difficult to estimate their populations precisely. But the rural nature of the Modoc Bioregion is reflected in the populations of the two counties totally contained within its boundaries: Modoc, 10,700, and Lassen, 29,800. According to 1990 census figures, Modoc has the smallest population of all 10 bioregions, with fewer than 81,000. The largest cities are Alturas, the Modoc County seat; Susanville, the Lassen County seat; Burney in eastern Shasta County, and Maglia in northern Butte County.

The Northern Paiute and the Paiute-Shoshone tribes are native to this bioregion. Indian reservations include Fort Bidwell, Alturas, Cedarville, Likely, and Lookout Rancherias; and Pit River, all in Modoc County.

Main highways are U.S. Highway 395 and state routes 299, 139, 89, 44, and 36.

C.2.2 Industry

Ranching is the major agricultural industry, and timber is a significantly large employer.

C.2.3 Climate and Geography

The climate features hot, dry summers and cold, moist winters with snow at higher elevations. Geography is varied in the Modoc Bioregion, with volcanic areas and wetlands to the west and high desert to the east. Lassen Volcanic National Park, which is studded with lakes and crowned by 10,457-foot Lassen Peak; Tule Lake, and Clear Lake National Wildlife Refuges, Ahjumawi Lava Springs State Park, and Lava Beds National Monument are on the western side. The eastern side, which resembles its neighbor, Nevada, has desert alkali lakes, Honey Lake Valley, and Modoc National Wildlife Refuge. The last volcanic activity at Mount Lassen was in 1915.

The bioregion includes Modoc and Lassen National Forests and part of the Klamath National Forest. The largest lakes are Lake Almanor in Plumas County, Eagle Lake in Lassen County, Lower Klamath Lake in Siskiyou County, and Goose Lake in Modoc County. The Pit River flows southwest from the rugged Warner Mountains in eastern Modoc and Lassen counties across the Modoc Plateau and into the Sacramento River.

C.2.4 Plants and Wildlife

Juniper and sagebrush cover much of the eastern side of the Modoc Bioregion, while yellow and Jeffrey pine, white fir, mixed conifer, cedar, and aspen are common in the more mountainous and forested areas to the west. Rare plants include yellow arrowleaf, balsam root, long-haired star tulip, spiny milkwort, Ash Creek ivesia, Raven's lomatium, and woolly stenotus.

Wildlife include bald eagles, antelope, greater sandhill cranes, ospreys, Canada geese, black- crowned night herons, mule deer, muskrats, pronghorn, cinnamon teal, northern pintails, Swainson's hawks, sage grouse, rainbow trout, marmots, hummingbirds, great horned owls, black bears, coyotes, porcupine, Modoc sucker, goshawk, bank swallow, Shasta crayfish, sage grouse, and Lost River sucker.

C.3 Klamath/North Coast Bioregion (CERES 2011b)

The Klamath/North Coast Bioregion in California's northwestern corner extends roughly one- quarter of the way down the 1,100-mile coast and east across the Coastal Range and into the Cascades. This bioregion is famous for its rocky coastline, salmon fishing, and lush mountain forests of spectacular ancient redwoods and Douglas fir. Redwood National Park and numerous state parks, rivers, wilderness areas, and four national forests are in this bioregion.

C.3.1 Location, Cities, and Population

Ten counties make up the Klamath/North Coast Bioregion: Del Norte, most of Siskiyou, Humboldt, Trinity, Mendocino, Lake, and the northwestern portions of Shasta, Tehama, Colusa, and Glenn. Its boundaries are the Oregon border on the north, and the southern borders of Lake and Mendocino counties on the south. Despite the huge area of this bioregion, its population is only about 410,000 according to 1990 census figures. The bioregion extends from the Pacific Coast eastward more than halfway across California to the Modoc Plateau and the Sacramento Valley floor. The Hoopa Valley, Yurok, Karok, Paiute-Shoshone, and Pomo-Kato Indians are native to various parts of this bioregion.

The largest cities are Redding -- a Northern California crossroad on Interstate 5 -- and Eureka, a Humboldt County seaport. Smaller cities include Clearlake, Ukiah, Arcata, Fort Bragg, Yreka, Mendocino, and Crescent City. Main highways are I-5, U.S. 101, and state Highways 36, 299, 96, and 3, which cross mountains and can be steep and winding.

C.3.2 Industry

Along the coast, redwood trees hundreds or thousands of years old are a cherished natural resource and major tourist attraction. These forests are home to the endangered marbled murrelet, a seabird that nests in old-growth, and the threatened northern spotted owl, whose decline prompted severe reductions in federal timber harvest sales to preserve its habitat.

Listing of the owl under the federal ESA and other 1990s environmental actions caused economic impacts upon the once-booming timber industry, such as forcing closure of many sawmills and dislocation of workers. Communities once dependent on timber activities are being forced to diversify their economies, and are encouraging the growth of tourism, improving infrastructure, and seeking ways to attract and accommodate new businesses. Cattle ranching, dairy farming, and fishing are popular traditional industries of the bioregion.

C.3.3 Climate and Geography

Much of the Klamath/North Coast Bioregion is covered by forest -- the Klamath, Shasta-Trinity, Six Rivers, and Mendocino National Forests, Jackson State Forest, and private forests, including the famous Headwaters ancient redwood forest in Humboldt County. This mountainous bioregion includes the North Coast Range and the Klamath, Siskiyou, Marble, Salmon, Trinity, and Cascade mountains. The Klamath/North Coast is the state's wettest climate, with rainfall distribution varying widely from an average annual 38 inches at Fort Bragg to 80 or more inches in the King Range National Conservation Area. The coastal climate is cool, moist, and often foggy, with rainy winters at lower elevations and snow in the higher mountains. Inland the climate is drier with low rainfall in winter and hot, dry summers.

Major rivers include the Eel, Trinity, Klamath, Russian, Smith, Salmon, Scott, Mad, and Mattole, which flows into the Pacific Ocean near seismically active Cape Mendocino. Clear Lake, Whiskeytown Lake, Clair Engle, and the western part of Shasta are the largest lakes in the bioregion.

C.3.4 Plants and Wildlife

Vegetation includes mixed conifer habitat of white fir, Douglas fir, ponderosa pine, Sierra lodgepole pine, incense cedar, sugar pine, red pine, Jeffrey pine, mountain hemlock, knobcone pine, western red cedar, red alder, redwood, tanoak, Pacific madrone, and chaparral. Rare plants include Sebastopol meadowfoam, Burke's goldfields, Humboldt Bay owl's clover, Calistoga ceanothus, Baker's navarretia, coast lily, swamp harebell, Tracy's sanicle, Snow Mountain willowherb, marsh checkerbloom, pale yellow stonecrop, Scott Mountain phacelia, McDonald's rock cress, Klamath Mountain buckwheat, Oregon fireweed, Adobe lily, dimorphic snapdragon, Colusa layia, Indian Valley brodiaea, and Stebbins' lewisia.

Wetlands provide places for resting, nesting, feeding and breeding for native and migrating birds and waterfowl. Wildlife in the bioregion includes deer, fox, black bear, mountain lion, California clapper rail, Aleutian Canada geese, Roosevelt elk, osprey, fisher, bank swallow, Coho salmon, king salmon, Lotis blue butterfly, bald eagle, Point Arena mountain beaver, Swainson's hawk, willow flycatcher, western sandpiper, and Oregon silverspot butterfly. Rare species include northern spotted owl, marbled murrelet, American peregrine falcon, Lotis blue butterfly, Trinity bristle snail, red-legged frog, Siskiyou Mountains salamander, Pacific fisher, Del Norte salamander, Karok Indian snail, wolverine, goshawk, and Chinook salmon.

C.4 Sacramento Valley Bioregion (CERES 2011c)

The Sacramento Valley Bioregion, a watershed of the Sierra Nevada, is rich in agriculture, but is also significant as the seat of California's state government. Lying halfway between the Pacific Ocean and the Sierra Nevada, the Sacramento Valley affords convenient travel time to San Francisco and Lake Tahoe. The bioregion encompasses the northern end of the great Central Valley, stretching from Redding to the southeast corner of Sacramento County. Its southern boundary borders the northern edge of the Sacramento-San Joaquin River Delta. Sacramento, the home of California's state Capitol, sits at the confluence of the Sacramento and American Rivers.

C.4.1 Location, Cities, and Population

The broad, flat valley that comprises this bioregion touches nine counties, including all of Sutter, most of Sacramento, and Yolo, and portions of Butte, Colusa, Glenn, Placer, Shasta, Tehama, and Yuba counties. Sacramento, with a population of about 400,000, is the bioregion's largest city and ranks seventh in the state behind Fresno, Long Beach, San Francisco, San Jose, San Diego, and Los Angeles. Other large cities, all smaller than Sacramento, include Redding, Chico, Davis, West Sacramento, and Roseville. More than 1.5 million people inhabit this bioregion, making it the fourth most populous of the 10 bioregions, based on 1990 census figures. The cultural roots of the region date from Native American inhabitants, such as the Wintun Indians, to 19th century settlers who established and worked the farms and ranches.

Two of the state's major interstate highways, I-5, the state's main north-south artery, and transcontinental I-80, intersect in Sacramento. Other main highways include U.S. Highway 50, and State Highways 99, 44, 113, 70, and 20.

C.4.2 Industry

Agriculture and state government are important industries in the Sacramento Valley bioregion, but only three of the counties -- Sutter, Yolo, and Colusa -- rank among California's top 20 agricultural producers. Still, the valley is known for tomatoes, rice, and olives, among other prominent crops produced in the plentiful fields and orchards.

Food canneries, high-technology, and biotechnology play a significant role. The bioregion once had a substantial military presence with three Air Force bases, but downsizing changed the picture, closing Mather, then adding McClellan to the closure list, but sparing Beale. Shipping is important in the port of West Sacramento.

C.4.3 Climate and Geography

The changing of the seasons is more evident in the Sacramento Valley than in the coastal regions to the west. Summer hot spells that drive daytime temperatures into triple digits are relieved by cooling “Delta breezes” that carry moist air from San Francisco Bay eastward through the Delta and into the Sacramento area. The brief mild autumn ends when tule fog blankets the valley for much of the winter season from December into February, keeping temperatures chilled. Except during droughts, rainfall is frequent in winter, but snowfall is unusual because temperatures, particularly in the daytime, normally remain well above freezing.

The Sacramento Valley is flat for the most part, but is situated within view of mountains, which are particularly visible on clear days. To the west, the coastal range foothills loom on the horizon, while the snow-capped peaks of the Sierra Nevada can be been to the east.

The valley's two major rivers—the Sacramento and American—carry water that originates in the Sierra Nevada south and west into the Sacramento-San Joaquin River Delta. The Delta supplies water to about two-thirds of California's 32 million residents. Other rivers include the Consumnes—the largest free-flowing river in the Central Valley—the lower Feather, Bear, and Yuba Rivers.

C.4.4 Plants and Wildlife

Oak woodlands, riparian forests, vernal pools, freshwater marshes, and grasslands provide the major natural vegetation of the Sacramento Valley Bioregion. The Sacramento Valley is the most prominent wintering site for waterfowl, attracting more than 1.5 million ducks and 750,000 geese to its seasonal marshes along the Pacific Flyway. Species include northern pintails, snow geese, tundra swans, sandhill cranes, mallards, grebes, peregrine falcons, heron, egrets, and hawks. Black-tailed deer, coyotes, river otters, muskrats, beavers, ospreys, bald eagles, salmon, steelhead, and swallowtail butterflies are just some of the wildlife that abounds in this bioregion. Species on the endangered species list include the winter-run Chinook salmon, delta smelt, giant garter snake, and the western yellow-billed cuckoo.

C.5 Bay Area/Delta Bioregion (CERES 2011d)

The Bay Area/Delta Bioregion is one of the most populous, encompassing the San Francisco Bay Area and the Sacramento-San Joaquin River Delta. Environmentally, the bioregion is the focus of debate over conflicting demands for the water that flows through the Delta, supplying two-thirds of California's drinking water, irrigating farmland, and sustaining fish and wildlife and their habitat. Under a historic accord in 1994, competing interests initiated a process for working together to “fix” the Delta.

C.5.1 Location, Cities, and Population

The bioregion fans out from San Francisco Bay in a jagged semi-circle that takes in all or part of 12 counties, including the state's top six in family income: Marin, Contra Costa, Santa Clara, Alameda, Solano, San Mateo, as well as the counties of San Francisco, Sonoma, Napa, San Joaquin, and parts of Sacramento, and Yolo. Major cities include San Francisco, Santa Rosa, Oakland, Berkeley, Vallejo, Concord, and San Jose. Though of moderate size, the Bay-Delta Bioregion is the second most populous bioregion, next to the South Coast, with 6.6 million people, based on the 1990 census.

The Bay Area/Delta Bioregion extends from the Pacific Ocean to the Sacramento Valley and San Joaquin Valley bioregions to the northeast and southeast, and a short stretch of the eastern boundary joins the Sierra Bioregion at Amador and Calaveras counties. The bioregion is bounded by the Klamath/North Coast on the north and the Central Coast Bioregion to the south.

Major highways are Interstate 80, which concludes its transcontinental journey in San Francisco, I-280, I-580 and I-680, U.S. 101. State highways include 1, 12, 24, 29, 84, 92, 113,116, 121, and 128.

C.5.2 Industry

Prominent industries of this bioregion include banking, high-technology and biotechnology, wine-making, fishing, shipping, oil refining, dairy farming, beer brewing, and fruit ranching. The Pacific coastal area of this bioregion features Point Reyes National Seashore, John Muir Woods National Monument, Golden Gate National Recreation Area, and numerous state parks and state beaches.

C.5.3 Climate and Geography

The temperatures in this Mediterranean climate don't vary much year-around. The coast experiences relatively cool, often foggy summers, mild falls, and chilly, rainy winters. Further inland, hot dry summers and warm autumns are followed by mild, wet winters. Snowfall is rare. The bioregion is mostly hilly with low coastal mountains and several peaks rising above 3,000 feet, including Mt. Diablo at 3,849 feet, in a state park. Coastal prairie provides grazing for wild and domestic animals, including dairy cattle.

The bioregion is named for its two major watersheds, San Francisco Bay and the Delta. Major rivers include the Russian, Gualala, Napa, Petaluma, and Alameda, and Putah Creeks. A network of reservoirs and canals comprise the State Water Project delivery system. Lake Berryessa in Napa County is the largest lake.

C.5.4 Plants and Wildlife

The habitats and vegetation of the Bay Area/Delta Bioregion are as varied as the geography. Coastal prairie scrub, mixed hardwoods and valley oaks are found among the rolling hills and mountains that descend to the ocean. Redwoods abound in Santa Cruz County. Coastal salt marsh lies around San Francisco Bay, and freshwater marshes are found in the Delta.

Eucalyptus, manzanita, northern coastal scrub, California buttercups, goldfields, and Tiberon mariposa lily also are popular in the bioregion. Rare plants include Marin western flax, Baker's manzanita, Point Reyes checkerbloom, and Sonoma sunshine. Salt and freshwater marshes provide pickleweed, great bulrush, saltbush, and cattail.

Wetlands in the Bay-Delta -- brackish and freshwater -- furnish resting, nesting, feeding and breeding places for birds and waterfowl along the Pacific Flyway. These marshes, rich in biodiversity, are popular and necessary wintering spots for migrating birds.

Birds include canvasback, western grebe, black-crowned night heron, great egret, snowy egret, California brown pelican, white pelican, gull, acorn woodpecker, golden eagle, western bluebird, Caspian tern, American avocet, and cedar waxwing. Marine life includes Chinook salmon, harbor seal, sea lion, leopard shark, and bat ray. Other wildlife includes grey fox, mule deer, bobcat, raccoon, Pacific tree frog, and the swallowtail and painted lady butterfly.

Endangered species include the California least tern, California black rail and clapper rail, Smith's blue butterfly, salt marsh harvest mouse, California freshwater shrimp, northwestern pond turtle, and tidewater goby.

C.6 Sierra Bioregion (CERES 2011e)

The Sierra Bioregion is a vast and rugged mountainous area extending some 380 miles along California's eastern side and largely contiguous with Nevada. Named for the Sierra Nevada mountain range it encompasses, the Sierra Bioregion includes magnificent forests, lakes, and rivers that generate much of the state's water supply. It shares Lake Tahoe with Nevada and features eight national forests, three national parks -- Yosemite, Kings Canyon and Sequoia -- numerous state parks, historical sites, wilderness, special recreation and national scenic areas, and mountain peaks, including 14,495-foot Mt. Whitney.

C.6.1 Location, Cities, and Population

Eighteen counties, or their eastern portions, comprise the Sierra Bioregion: Alpine, Amador, Butte, Calaveras, El Dorado, Fresno, Inyo, Kern, Madera, Mariposa, Mono, Nevada, Placer, Plumas, Sierra, Tulare, Tuolumne, and Yuba. The bioregion extends from the northern edge of the Plumas National Forest south to Tejon Pass in the Tehachapi Mountains about 30 miles southeast of Bakersfield. The northern half of the Sierra Bioregion is bordered by the Nevada state line to the east and the Sacramento Valley floor to the west. The southern half of the Sierra extends westward from the Nevada state line and the western edge of the Bureau of Land Management's California Desert Conservation Area to the San Joaquin Valley floor. California's historic Mother Lode region of 19th century Gold Rush fame is in the Sierra Bioregion.

Scattered throughout the mountains are small cities such as Truckee, Placerville, Quincy, Auburn, South Lake Tahoe, and Bishop. The Sierra Nevada Ecosystem Project (SNEP) fixed the Sierra population at 650,000, which is consistent with 1990 census figures.

Major routes for vehicular traffic are Interstate 80, U.S. Highways 50 and 395, and state highways 4, 49, 70, 88, 89, 108, 120, and 178. Some mountain roads at higher elevations are closed in winter because of snow, and highways frequently require chains or snow tires for travel.

C.6.2 Industry

High tech has emerged as a significant industry in the Sierra, introducing satellite, on-line, and computer software companies and stimulating entrepreneurial small businesses. This growing segment of the economy joins staples such as hydropower, tourism and recreation. Other industries include logging, cattle ranching, and -- in the northern Sierra foothills -- apple orchards and wineries.

C.6.3 Climate and Geography

The climate varies with the elevation, offering cold snowy winters and cool summers at higher elevations and rainy winters and mild summers in the foothills. Summers are dry. Snowy winters in the northern Sierra are crucial to California's water supply, which depends heavily upon spring snowmelt to feed the reservoirs of the State Water Project and a portion of the federal Central Valley Project. The projects supply about two-thirds of California's water for drinking, irrigation, and industrial use. Snowfall also is welcomed by the ski industry and a myriad of other businesses that serve and supply skiers. Mild dry mountain summers accommodate outdoor sports and activities, but when high pressure areas push temperatures upward and gusty winds blow, California is vulnerable to wildfires that consume thousands of acres of brush and timber every year.

National forests of the Sierra Bioregion are the Plumas, Tahoe, Sierra, Eldorado, Stanislaus, Sequoia, Inyo, and Toiyabe. Major rivers include the American, Feather, Yuba, Cosumnes, Tuolumne, Merced, San Joaquin, Kern, Owens, Kings, Carson, Truckee, Walker, and Stanislaus. Mono Lake east of Yosemite is famous for its peculiar tufa formations rising from the lake bed.

C.6.4 Plants and Wildlife

The Sierra Bioregion is rich in biodiversity, containing over half the plant species found in California and more than 400 of the state's terrestrial wildlife species, or about two-thirds of the birds and mammals and half the reptiles and amphibians. The variety of habitat types include annual grassland, blue oak savannah, chaparral, ponderosa pine, black oak woodland, mixed conifer, red fir, riparian, alpine meadow, Jeffrey pine, sagebrush, and bitter brush.

Animals that inhabit the Sierra Bioregion include lodgepole chipmunk, mountain beaver, California mountain king snake, black bear, wolverine, California big horn sheep, Pacific fisher, mule deer, and mountain lion. The California Golden Trout -- the state fish -- is native to the Southern Sierra. Birds include the northern goshawk, mountain chickadee, pine grosbeak, California spotted owl, mountain quail, willow flycatcher, bald eagle, and great grey owl.

C.7 San Joaquin Valley Bioregion (CERES 2011f)

The San Joaquin Valley Bioregion in the heart of California is the state's top agricultural producing region. The bioregion is bordered on the west by the coastal mountain ranges. Its eastern boundary joins the southern two-thirds of the Sierra bioregion, which features Yosemite, Kings Canyon, and Sequoia National Parks.

C.7.1 Location, Cities, and Population

Eight counties comprise the San Joaquin Valley bioregion, including all of Kings County, most of Fresno, Kern, Merced, and Stanislaus counties, and portions of Madera, San Luis Obispo, and Tulare counties. This growing bioregion, the third most populous out of ten, has an estimated 2 million people, according to 1990 census data. The largest cities are Fresno, Bakersfield, Modesto, and Stockton. Some of California's poorest cities are in Fresno, Kern, and Tulare counties. At its northern end, the San Joaquin Valley bioregion borders the southern end of the Sacramento Valley bioregion. To the west, south, and east, the bioregion extends to the edges of the valley floor. Native people of the bioregion include the Mono and Yokut Indians. Native lands include the Tule River Indian Reservation in Tulare County, Cold Springs Rancheria, and Table Mountain and Big Sandy Reservations in Fresno County, and Santa Rosa Rancheria in Kings County.

Interstate 5 and State Highway 99 are the major north-south roads that run the entire length of the bioregion. Other main routes include State Highways 33, 41, 43, 65, 132, 140, 178, 180, and 198.

C.7.2 Industry

The San Joaquin Valley is California's leading agricultural producing bioregion, and five of its counties -- Fresno, Kern, Tulare, Merced, and Stanislaus-- rank among the state's top 10 counties in farm production value. Oil and gas also are important industries in the San Joaquin bioregion. The deepest wells and about half of the largest oil fields are found in Kern County, as is the Elkhorn Hills Naval Petroleum Reserve. Lemoore Naval Air Station west of Visalia also is in this bioregion.

C.7.3 Climate and Geography

Well-suited for farming, the bioregion is hot and dry in summer with long, sunny days. Winters are moist and often blanketed with heavy fog. The broad, flat valley is ringed by the Diablo and Coast Ranges on the west and the Sierra Nevada foothills on the east. Habitat includes vernal pools, valley sink scrub and saltbush, freshwater marsh, grasslands, arid plains, orchards, and oak savannah. The growth of agriculture in the Central Valley has converted much of the historic native grassland, woodland, and wetland to farmland.

The major river is the San Joaquin, with tributaries of the lower Stanislaus, Tuolumne, Merced, and Fresno rivers. The California Aqueduct extends the entire length of the bioregion. The southern portion of the bioregion includes the Kings, Kaweah, and Kern rivers, which drain into closed interior basins. No significant rivers or creeks drain into the valley from the Coast Range.

C.7.4 Plants and Wildlife

Historically, millions of acres of wetlands flourished in the bioregion, but stream diversions for irrigation dried all but about 5 percent. Precious remnants of this vanishing habitat are protected in the San Joaquin Valley bioregion in publicly owned parks, reserves, and wildlife areas. Seasonal wetlands are found at the Kern National Wildlife Refuge west of Delano, owned by the U.S. Fish and Wildlife Service. It attracts a variety of ducks, shorebirds, and song birds, as well as peregrine falcons.

The Tule Elk State Reserve west of Bakersfield, owned by the state Department of Parks and Recreation, features the habitat of the tule elk -- natural grassland with ponds and marshes. The reserve sustains four endangered species -- the San Joaquin kit fox, blunt-nosed leopard lizard, San Joaquin antelope squirrel, and Tipton kangaroo rat -- the threatened plant Hoover's woolystar, and other rare species, such as western pond turtles, tricolored blackbird, and northern harrier. Endangered species of the bioregion also include the California tiger salamander, Swainson's hawk, and giant and Fresno kangaroo rat. Other rare species include the western yellow-billed cuckoo and valley elderberry longhorn beetle.

About one-fifth of the state's remaining cottonwood and willow riparian forests are found along the Kern River in the South Fork Wildlife Area. Great blue herons, beavers, coyotes, black bears, mountain lions, red-shouldered hawks, and mule deer can be seen in the wildlife area. Other wildlife viewing sites are Millerton Lake State Recreation Area west of Madera, Little Panoche Wildlife Area near Los Banos, and the Valley Grasslands of Merced County, which attract 500,000 to 1 million birds each winter to lands owned by the state Departments of Fish and Game and Parks and Recreation, Fish and Wildlife Service, and privately. The San Luis Dam and Reservoir area, jointly operated by the state Department of Water Resources and U.S. Bureau of Reclamation, draws wintering bald eagles, abundant ducks, gopher snakes, San Joaquin kit foxes, and black-tailed deer.

Rare plants in the bioregion include Mason's lilaeopsis, San Joaquin woollythreads, and California hibiscus.

C.8 Central Coast Bioregion (CERES 1996)

The Central Coast Bioregion features coastal scenery, with a mild, seasonally moist, and sometimes foggy climate that favors rich farmland and vineyards. This highly agricultural region is famous for artichokes, garlic, and an array of fruits and vegetables. Other industries include wine-making, dairy, and cattle ranching. The coast supports a brisk fishing industry, and oil production along the southern end of the bioregion.

C.8.1 Industry

The bioregion extends some 300 miles from just north of Santa Cruz to just south of Santa Barbara, and inland to the floor of the San Joaquin Valley. It encompasses the counties of Santa Cruz, Monterey, San Benito, Santa Barbara, and portions of Los Angeles, San Luis Obispo, Fresno, Merced, Stanislaus, and Ventura. The region includes military installations Fort Ord, Camp Roberts, and Vandenberg Air Force Base. The geography offers coastal mountain ranges including the Santa Lucia and Santa Ynez, and coastal sand dunes. Vegetation includes chaparral, mixed hardwood and redwood forests in the bioregion's northern coastal area, and oak woodlands. The Los Padres National Forest covers much of the southern portion of the bioregion. The Salinas and Cuyama rivers feed the bioregion's two major watersheds.

C.9 Mojave Desert Bioregion (CERES 2011g)

The Mojave Bioregion is one of California's largest bioregions and a desert showcase. The eastern boundary is contiguous with the borders of Nevada and Arizona. To the north and west, the Mojave borders the Sierra bioregion, and to the south, it is bounded by the South Coast and Colorado Desert bioregions.

C.9.1 Location, Cities, and Population

Seven counties make up the Mojave bioregion: nearly all of San Bernardino, most of Inyo, the southeastern tips of Mono and Tulare, the eastern end of Kern, northeastern desert area of Los Angeles, and a piece of northern-central Riverside County. The largest cities are Palmdale -- one of California's fastest-growing communities -- Victorville, Hesperia, Ridgecrest, and Barstow. The Mojave Bioregion, historically a sparsely populated expanse of desert, had nearly 612,000 people as of the 1990 census, but is growing rapidly, as urban congestion and housing costs push people farther into the open areas.

Native Americans lands in the Mojave bioregion include the Chemehuevi Indian Reservation on the Colorado River, Twenty-nine Palms Indian Reservation, Fort Mojave Indian Reservation, and Fort Mojave Trust Lands, which both straddle the California-Nevada border.

C.9.2 Industry

The Mojave bioregion is the home of three national parks -- Death Valley, East Mojave, and Joshua Tree -- under the National Park Service. The state Department of Parks and Recreation manages the Providence Mountains State Recreational Area near Goffs in eastern San Bernardino County, and the U.S. Fish and Wildlife Service operates Havasu National Wildlife Refuge on the Colorado River near Lake Havasu.

Military installations include Edwards Air Force Base in Kern, Los Angeles, and San Bernardino counties; Twenty-nine Palms Marine Corps Air Ground Combat Center, Fort Irwin Military Reservation, Inyokern Naval Ordnance Test Station, and China Lake U.S. Naval Ordnance Test Station in San Bernardino, Inyo, and the eastern end of Kern counties. Much of the desert is under the U.S. Bureau of Land Management, which manages the Desert Tortoise Natural Area northeast of Palmdale, and Harper Lake near Barstow. The BLM has created a multi-agency, multi-species plan for the desert that designates certain areas for habitat, multiple uses, and development. It is designed to conserve habitat, foster economic development, and streamline the permitting process for development.

Major highways in the bioregion are Interstates 15, 40, U.S. Highway 395, and State Highways 18, 58, 62, and 127, and 247.

Mining—including lucrative gold mining—is a major industry in the Mojave bioregion. Off-road vehicle riding is a popular sport in the desert, which offers many trails across the plains and through the scrub. Ranching and livestock grazing are significant economic interests in this bioregion.

C.9.3 Climate and Geography

The Mojave bioregion is the western extension of a vast desert that covers Southern Nevada, the southwestern tip of Utah, and 25 million acres of Southern California -- one quarter of the state. The climate is hot and dry in summer. Winters are cool to cold, depending on the elevation, with occasional rainstorms that can quickly turn a gulch or dry lake into a flash flood zone.

The landscape is mostly moderately high plateau with elevations averaging 2,000 to 3,000 feet and isolated peaks that exceed 6,000 and 7,000 feet. Though appearing barren and remote, the desert teems with biodiversity, and more than 90 percent is within three miles of a paved road or off-road vehicle track.

Palm oases provide water for wildlife, as do many streams and springs. In prehistoric times, the bioregion contained great desert lakes, which have long since evaporated and seeped underground. This bioregion has the lowest elevation in North America, 282 feet below sea level in Death Valley National Park. The Mojave, Amargosa, and Colorado Rivers are the largest rivers in this mostly arid bioregion.

C.9.4 Plants and Wildlife

Common habitats of the Mojave bioregion are: desert wash, Mojave creosote bush, scattered desert saltbush, Joshua tree scrub, alkali scrub, palm oasis, juniper-pinyon woodland, and some hardwood and conifer forests at higher elevations. Cottonwood willow riparian forest is rare habitat in this bioregion, as is alkali marsh and open sandy dunes.

Rare animals include the Mohave ground squirrel, prairie falcon, Le Conte's thrasher, Nelson's bighorn sheep, gray vireo, desert tortoise, pale big-eared bat, Amargosa vole, and Mohave tui chub, an olive-brown and silver fish, and the cottontail marsh pupfish, found only in Death Valley National Park. Parks and recreation areas that provide water are the home of snowy plovers, least sandpipers, killdeer, white pelicans, teal, and thousands of migratory wading shore birds, as well as eagles, harriers, falcons, owls, coyotes, badgers, great blue herons, least Bell's vireos, red-tailed hawks, and Canada geese.

Rare plants include white bear poppy, Barstow woolly sunflower, alkali mariposa lily, Red Rock poppy, Mojave monkeyflower, and Stephen's beardtongue.

C.10 Colorado Desert Bioregion (CERES 2011h)

The Colorado Desert Bioregion in the southeastern corner of California extends from the Mexican border north to San Bernardino County and the southern edge of the Joshua Tree National Park, east to the Colorado River and Arizona, and west into Riverside and San Diego counties. This agriculturally rich bioregion is semi-arid, but heavily irrigated.

C.10.1 Location, Cities, and Population

With a population of about 375,000, according to 1990 census figures, the Colorado Desert is the second least populous of the ten bioregions. Only the Modoc Bioregion has fewer people. The bioregion encompasses all of Imperial County, the southeastern portion of Riverside County, the eastern end of San Bernardino County, and the eastern portion of San Diego County. Its most prominent cities are Palm Springs, Rancho Mirage, El Centro, and the smaller, but landmark communities of Blythe, Coachella, and Calexico. The bioregion is home to the Fort Yuma Indian Reservation in Imperial County and Arizona, the Colorado River Indian Reservation in Riverside County, and the Campo and Manzanita Indian Reservations in San Diego County. Imperial County has the state's lowest median family income.

Major highways are Interstate 10 in Riverside County, Interstate 8 in Imperial and San Diego counties, and State Highways 111 and 115 in Imperial County.

C.10.2 Industry

Imperial County is one of California's top-ranking agricultural counties and a producer of cotton. Military installations include the Chocolate Mountains Naval Aerial Gunnery Range and the Naval Desert Test Range.

C.10.3 Climate and Geography

The Colorado Desert is the western extension of the Sonoran Desert that covers southern Arizona and northwestern Mexico. It is a desert of much lower elevation than the Mojave Desert to the north, and much of the land lies below 1,000 feet elevation. Mountain peaks rarely exceed 3,000 feet. Common habitat includes sandy desert, scrub, palm oasis, and desert wash. Summers are hot and dry, and winters are cool and moist.

The Colorado River flows along the entire eastern boundary of the Colorado Desert bioregion on its way to Yuma, Ariz., where the two states and Mexico come together. The only other river of significant size in this bioregion is the polluted New River, which flows from Mexico into the Salton Sea, the region's largest body of water, on the border of Imperial and Riverside counties. The Salton Sea was created in 1905 when the Colorado River broke through an irrigation project and flooded a saline lakebed, creating an inland sea, which now lies about 235 feet below sea level and is some 35 miles long and 15 miles wide.

Anza Borrego Desert State Park, located mostly in eastern San Diego County, but jutting into Imperial County, is the bioregion's largest recreation area, covering 600,000 acres. It offers more than 225 bird species and dozens of mammals, amphibians, and reptiles. Bighorn sheep can be seen there, as well as thrashers and owls.

C.10.4 Plants and Wildlife

Other species in the Colorado Desert are Yuma antelope ground squirrels, white-winged doves, muskrats, southern mule deer, coyotes, bobcats, and raccoons. Rare animals include desert pupfish, flat-tailed horned lizard, prairie falcon, Andrew's dune scarab beetle, Coachella Valley fringe-toed lizard, Le Conte's thrasher, black-tailed gnatcatcher, and California leaf-nosed bat.

Rare plants include Orcutt's woody aster, Orocopia sage, foxtail cactus, Coachella Valley milk vetch, and crown of thorns.

Picacho State Recreation Area on the Arizona border, operated by the state Department of Parks and Recreation, offers boat rides on the Colorado River from which can be seen migratory cormorants, mergansers, white pelicans, and wintering bald eagles. Trails into the rugged backcountry lead to the habitat of desert bighorn sheep, feral burros, golden eagles, and nesting prairie falcons.

The Salton Sea National Wildlife Refuge features open water, salt marshes, freshwater ponds, and desert scrub, which attract nearly 400 bird species, including great roadrunners, Gambel's quail, Albert's towhees, endangered Yuma clapper rails, egrets, plovers, northern pintails, Canada geese, snow geese, rough-legged hawks, peregrine falcon, terns, yellow-headed blackbirds, hooded orioles, and white-faced ibises. The refuge is operated by the state Departments of Fish and Game and Parks and Recreation, and the U.S. Fish and Wildlife Service.

Dos Palmas Preserve, near Indio, owned by the U.S. Bureau of Land Management, offers a lush desert oasis with a restored wetland that accommodates endangered desert pupfish. The preserve attracts an array of wildlife, such as hooded orioles, warblers, snowy egrets, ospreys, American avocets, and horned lizards. The western fringe of the Imperial National Wildlife Refuge, located mostly in Arizona, is also in this bioregion.

C.11 South Coast Bioregion (CERES 2011i)

The South Coast Bioregion is an area of starkly contrasting landscapes ranging from rugged coastal mountains, world-famous beaches, rustic canyons, rolling hills, and densely populated cities. The bioregion extends from the southern half of Ventura County to the Mexican Border and east to the edge of the Mojave Desert. Two of California's largest metropolitan areas -- Los Angeles and San Diego -- are in this bioregion.

C.11.1 Location, Cities, and Population

Bounded on the north by the southern end of the Los Padres National Forest, the bioregion extends some 200 miles south to Mexico, east to the Mojave Desert and west to the Pacific Ocean. The bioregion encompasses all or part of six counties: the coastal half of Ventura County, all of Orange County, most of Los Angeles County, the southwestern edge of San Bernardino County, the western end of Riverside County, and the western two-thirds of San Diego County. Major cities include Los Angeles, San Diego, Long Beach, Santa Ana, Anaheim, Riverside, and San Bernardino. The South Coast, home to two of the state's largest cities, is the most populous bioregion with more than 19.5 million people, according to 2010 census figures.

Metropolitan Los Angeles, a major transportation hub, is crisscrossed by a network of freeways that have names as well as numbers. For example, Interstate 5, California's main north-south highway, is known in different segments as the Golden State Freeway, the Santa Ana Freeway, and the San Diego Freeway. Other major routes are Interstates, 8, 10, 15, 110, 210, 405, 605, and 805, U.S. 101, and State Highways 1 (the Pacific Coast Highway), 57, 60, 74, 76, 78, 91, 118, and 126.

As in much of California, the people of the South Coast bioregion reflect the state's cultural history. The Native American population includes many bands of Mission Indians, and the Spanish and Mexican heritage is evident in architecture, geographic names, and a large Spanish-speaking population. Rapid growth, employment opportunity, and a mild, mostly dry climate has attracted immigrants from all over the world, particularly in metropolitan Los Angeles.

C.11.2 Industry

Major industries include oil, agriculture, fishing, shipping, movies and television, banking and finance, computers, and aerospace, which has declined with the ending of the Cold War.

Military installations include Camp Pendleton Marine Corps Base, the former El Toro Marine Corps Air Station, March Air Force Base, Miramar Naval Air Station, North Island Naval Air Station, and Point Mugu Naval Pacific Missile Test Center.

C.11.3 Climate and Geography

The year-round mild climate and varied geographical features of the South Coast contribute to its great popularity. Hot dry summers with predictable wildfires are followed by wet winters with storms that can trigger mudslides on fire-denuded slopes. Smog remains a serious problem in the South Coast bioregion, particularly the Los Angeles basin, but air quality regulations have helped to control it.

The South Coast bioregion is a study in contrasts -- ocean and desert, flatlands and mountains, including 11,500-foot San Gorgonio Peak in Riverside County. Major rivers and their watersheds are: the Santa Clara, Los Angeles, Santa Ana, San Gabriel, San Luis Rey, San Jacinto, Santa Margarita, and San Diego. Publicly owned or managed lands include four national forests: the Angeles, Los Padres, Cleveland, and San Bernardino; numerous parks, state beaches, historic parks; and federal wilderness, recreation and wildlife areas, including Malibu Creek and Point Mugu State Parks, Bolsa Chica Ecological Reserve, Torrey Pines State Reserve, and Sweetwater and Tijuana National Wildlife Refuges. In San Diego, Orange and Riverside counties, the state's Natural Community Conservation Planning pilot program involving local, state, and federal partners is helping to protect the coastal sage scrub habitat of the threatened California gnatcatcher. In the Santa Monica Mountains, the National Park Service, Santa Monica Mountains Conservancy, and state Department of Parks and Recreation are helping to preserve spectacular habitat. In Ventura County, endangered California condors are protected at the Sespe Condor Sanctuary.

C.11.4 Plants and Wildlife

Tremendous urbanization in the South Coast bioregion has brought about the most intense effects on natural resources of any bioregion, resulting in alteration and destruction of habitat and proliferation of exotic or non-native species. In fact, the popular palm tree is not native to the Golden State. Habitat varies widely, from chaparral, juniper-pinyon woodland, and grasslands at lower elevations to mixed hardwood forest, southern oak, southern Jeffrey pine and southern yellow pine at higher levels. Along the coast, where real estate is especially prized, salt marshes and lagoons no longer are common habitat. But efforts are underway from Ventura County to the Mexican border to preserve and restore coastal wetlands.

The bioregion is home to mountain lions, coyotes, badgers, grey foxes, kit foxes, black bears, raccoons, mule deer, hawks, herons, golden eagles, ospreys, peregrine falcons, desert iguanas, dolphins, whales, endangered brown pelicans, and California sea lions. Rare animals include the Stephen's kangaroo rat, monarch butterfly, San Diego horned lizard, Peninsula desert bighorn sheep, orange-throated whiptail, California least tern, Belding's savannah sparrow, least Bell's vireo, Santa Ana sucker, arroyo southwestern toad and Tehachapi pocket mouse.

Rare plants include San Diego barrel cactus, Conejo buckwheat, Plummer's mariposa lily, mountain springs bush lupine, Otay tarplant, Laguna Mountains jewel flower, San Jacinto prickly phlox, and Mt. Gleason Indian paintbrush.

C.12 Hydrologic Regions of California

Hydrologists divide California into 10 hydrologic regions (California Interagency Watershed Map of 1999). The Regional Water Boards are defined (for the most part) by the boundaries of these hydrologic regions, as described in Water Code section 13200. Hydrologic regions are further divided into hydrologic units, hydrologic areas, and hydrologic subareas.

C.12.1 North Coast Hydrologic Region

The North Coast hydrologic region covers approximately 12.46 million acres (19,470 square miles) and encompasses the counties of Siskiyou, Del Norte, Trinity, Humboldt, Mendocino, Sonoma, and small areas of Marin. The region, extending from the Oregon border south to Tomales Bay, includes portions of four geomorphic provinces—the northern Coast Range, the Mad River drainage, the Klamath Mountains, and the coastal mountains. The majority of the population is located along the Pacific Coast and in the inland valleys north of the San Francisco Bay Area. The northern mountainous portion of the region is rural and sparsely populated, and most of the area is heavily forested. A majority of the surface water in the North Coast hydrologic region is committed to environmental uses because of the “wild and scenic” designation of most of the region’s rivers. Average annual precipitation in this hydrologic region ranges from 100 inches in the Smith River drainage to 29 inches in the Santa Rosa area.

Water bodies that provide municipal water include the Smith, Mad, and Russian Rivers. Areas providing agricultural water are more widespread than those for domestic, municipal and industrial use, as they occur in all of the hydrologic units within the region. Many of the smaller communities and rural areas are generally supplied by small local surface water and groundwater systems. Water recreation occurs in all hydrologic units on both fresh and salt water, attracting over 10 million people annually. Coastal areas receiving the greatest recreational use are the ocean beaches, the lower reaches of rivers draining to the ocean, and Humboldt and Bodega Bays. The Russian, Eel, Mad, Smith, Trinity, and Navarro Rivers and Redwood Creek provide the most freshwater recreational use.

Groundwater aquifers in the northeastern portion of the North Coast hydrologic region consist primarily of volcanic rock aquifers and some basin-fill aquifers. Coastal basin aquifers are predominantly found in the southern portion of this hydrologic region and along the northern coast. In general, though, a large percentage of this region is underlain by fractured hard rock zones that may contain localized sources of groundwater.

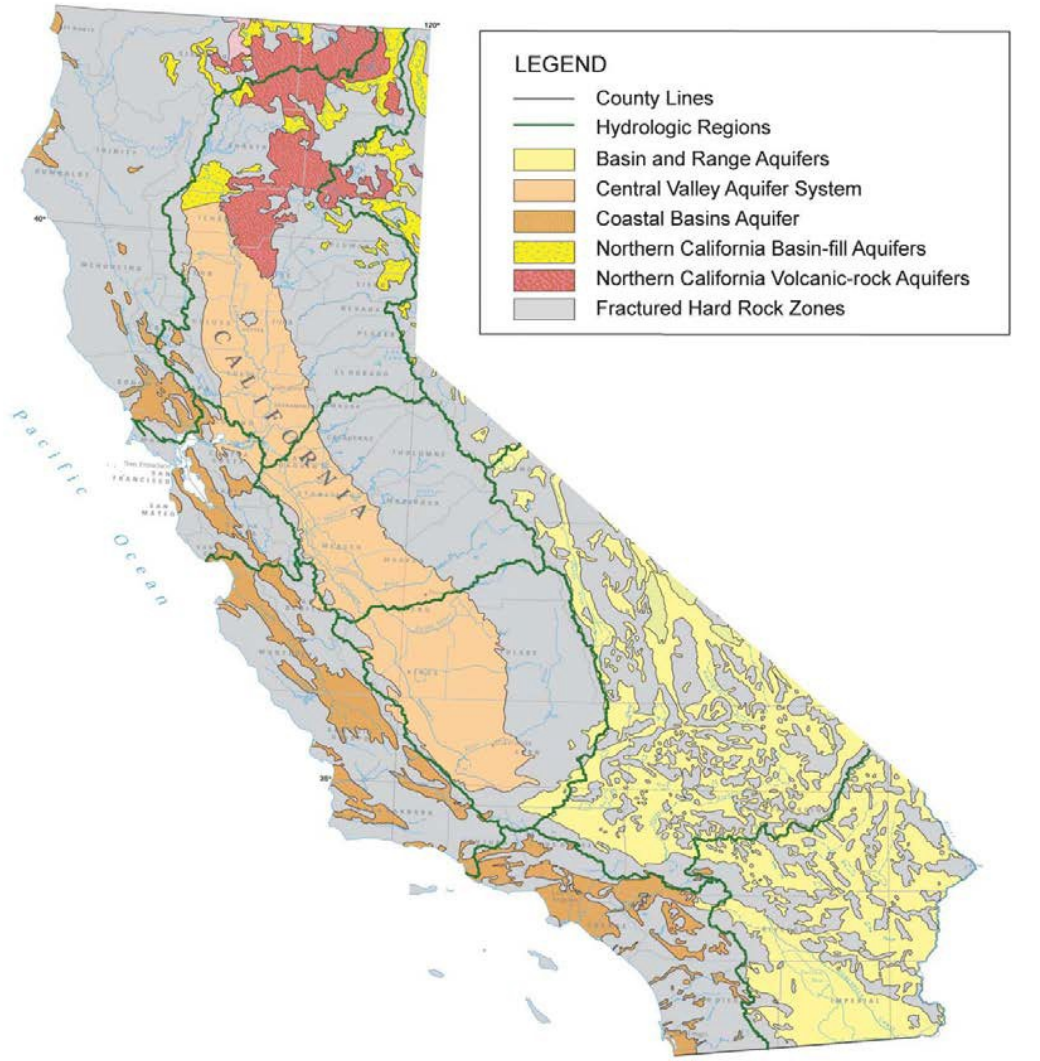
C.12.2 San Francisco Bay Hydrologic Region

The San Francisco Bay hydrologic region covers approximately 2.88 million acres (4,500 square miles) and encompasses the county and city of San Francisco and portions of Marin, Sonoma, Napa, Solano, San Mateo, Santa Clara, Contra Costa, and Alameda. Significant geographic features include the Santa Clara, Napa, Sonoma, Petaluma, Suisun-Fairfield, and Livermore valleys; the Marin and San Francisco peninsulas; San Francisco, Suisun, and San Pablo bays; and the Santa Cruz Mountains, Diablo Range, Bolinas Ridge, and Vaca Mountains of the Coast Range. Major rivers in this hydrologic region include the Napa and Petaluma, which drain to San Francisco Bay. Although this is the smallest hydrologic region in the state, it contains the second largest human population.

Coastal basin aquifers are the primary type of aquifer system in this region. They can be found along the perimeter of San Francisco Bay extending southeast into the Santa Clara

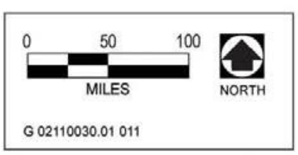
Figure C-2 California Hydrologic Regions and Aquifers

Valley, as well as in the Livermore Valley. The northeastern portion of this region, which includes the eastern Sacramento–San Joaquin Delta, is underlain by a portion of the Central Valley aquifer system. The remaining areas in this region are underlain by fractured hard rock zones.



Base modified from U.S. Geological Survey digital data, 1:2,000,000, 1972 Albers Equal-Area Conic projection Standard parallels 29°30′ and 45°30′, central meridian -96°00′

Modified from California Department of Water Resources, 1980; Plume and Carlton, 1988; U.S. Geological Survey, 1984; and J.R. Harrill, U.S. Geological Survey, written commun., 1991



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C.12.3 Central Coast Hydrologic Region

The Central Coast hydrologic region covers approximately 7.22 million acres (11,300 square miles) in central California, and includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara Counties, most of San Benito County, and parts of San Mateo, Santa Clara, and Ventura Counties. Groundwater is the primary source of water in the region, accounting for approximately 75 percent of the annual supply. Most of the freshwater in this region is found in coastal basin aquifers, with localized sources of groundwater also occurring in fractured hard rock zones throughout the region.

C.12.4 South Coast Hydrologic Region

The South Coast hydrologic region includes all of Orange County; most of San Diego and Los Angeles Counties; parts of Riverside, San Bernardino, and Ventura Counties; and a small portion of Kern and Santa Barbara Counties. Because it is the most populous area of the state, it is divided into three water quality control regions. The Los Angeles Regional Water Board encompasses portions of Ventura and Los Angeles counties. Santa Ana Regional Water Board encompasses portions of San Bernardino, Riverside, and Orange Counties. San Diego Regional Water Board encompasses portions of Orange, Riverside, and San Bernardino Counties. Approximately half of California's population, or about 17 million people, live within the boundaries of the South Coast hydrologic region. This, combined with its comparatively small surface area of approximately 6.78 million acres (10,600 square miles), gives it the highest population density of any hydrologic region in California. Major population centers include the metropolitan areas surrounding Ventura, Los Angeles, San Diego, San Bernardino, Orange County, and Riverside. Water use efficiency measures and water recycling efforts play a significant role in addressing increasing water use from population growth.

Groundwater is what supplies approximately 23 percent of the region's water in normal years and about 29 percent in drought years. Like the Central Coast hydrologic region, the majority of aquifers in this region are coastal basin aquifers. In the eastern central portion of the region includes lies a small section of basin and range aquifer and the remainder of the region is comprises fractured hard rock zones.

C 12.5 Central Valley Hydrologic Region

The Central Valley hydrologic region is the largest in California and encompasses the three subregions described below.

C 12.5.1 Sacramento River Hydrologic Subregion

The Sacramento River hydrologic subregion, which corresponds to roughly the northern third of the Central Valley Regional Water Board, covers 27,246 square miles and includes all or a portion of 20 predominately rural northern California counties. The subregion extends from the crest of the Sierra Nevada in the east to the summit of the Coast Range in the west, and from the Oregon border north downstream to the Sacramento–San

Joaquin River Delta (Delta). It includes the entire drainage area of the Sacramento River, the largest river in California, and its tributaries.

Groundwater in the northern half of this hydrologic subregion is, for the most part, contained in volcanic rock aquifers and some basin-fill aquifers. The southwestern half of this subregion is underlain by part of the Central Valley aquifer system. The remaining areas that comprise the southeastern half of the subregion and portions of the northern half of the subregion are underlain by fractured hard rock zones. Surface water quality in this hydrologic subregion is generally good. Groundwater quality in the Sacramento River subregion is also generally good, although there are localized problems.

C 12.5.2 San Joaquin River Hydrologic Subregion

The San Joaquin River hydrologic subregion is bordered on the east by the Sierra Nevada and on the west by the coastal mountains of the Diablo Range and extends from the southern boundaries of the Delta to the northern edge of the San Joaquin River in Madera. It consists of the drainage area of the San Joaquin River, which at approximately 300 miles long is one of California's longest rivers. The San Joaquin River hydrologic subregion, which corresponds to roughly the middle third of the Central Valley Regional Water Board, covers approximately 9.7 million acres (15,200 square miles). Roughly half of the Delta is within this hydrologic region, which extends south from just below the northeastern corner of Sacramento County and east to include the southern third of El Dorado County, almost all of Amador County, all of Calaveras, Mariposa, Madera, Merced, Stanislaus, and Tuolumne counties, the western slope of Alpine County, and the portions of the Delta in Contra Costa, Alameda, and San Joaquin Counties.

A portion of the Central Valley aquifer system underlies nearly all of the eastern half of this subregion, while the western half of this subregion consists of fractured hard rock zones. The groundwater quality throughout this hydrologic region is generally good and usable for most urban and agricultural uses, although localized problems occur.

C 12.5.3 Tulare Lake Hydrologic Subregion

The Tulare Lake hydrologic subregion is located in the southern end of the San Joaquin Valley and includes all of Tulare and Kings Counties and most of Fresno and Kern Counties. Major cities include Fresno, Bakersfield, and Visalia. The region, which corresponds to approximately the southern third of the Central Valley Regional Water Board, covers approximately 10.9 million acres (17,000 square miles). A small area at the southern end of this region is underlain by basin and range aquifers, while a majority of the western half is underlain by a portion of the Central Valley aquifer system The eastern half, once again, consists of fractured hard rock zones.

C 12.6 Lahontan Hydrologic Region

The Lahontan hydrologic region encompasses two subregions: the North Lahontan, extending north from the Oregon border near Mono Lake on the east side of the Sierra, and the South Lahontan, extending south to the crest of the San Gabriel and San Bernardino mountains and the divide between watersheds draining south toward the Colorado River and those draining northward.

C 12.6.11 North Lahontan Hydrologic Subregion

The North Lahontan hydrologic subregion extends south from the Oregon border approximately 270 miles to the South Lahontan region. Extending east to the Nevada border, it consists of the western edge of the Great Basin, and water in the region drains eastward toward Nevada.

Groundwater in the northern half of this subregion is primarily contained in basin-fill and volcanic rock aquifers, with some fractured hard rock zones. The southern half of this region is dominated by fractured hard rock zones, but small segments of basin and range aquifers also exist in this part of the subregion. The subregion, corresponding to approximately the northern half of the Lahontan Regional Water Quality Control Board (Lahontan Regional Water Board), covers approximately 3.91 million acres (6,110 square miles) and includes portions of Modoc, Lassen, Sierra, Nevada, Placer, El Dorado, Alpine, Mono, and Tuolumne Counties.

In general, the water quality in the North Lahontan hydrologic region is good. In basins in the northern portion of the region, groundwater quality is widely variable. The groundwater quality along these basin margins tends to be of higher quality, but the potential for future groundwater pollution exists in urban and suburban areas where single-family septic systems have been installed, especially in hard rock areas. Groundwater quality in the alpine basin ranges from good to excellent.

C 12.6.2 South Lahontan Hydrologic Subregion

The South Lahontan hydrologic subregion in eastern California, which includes approximately 21 percent of the state, covers approximately 21.2 million acres (33,100 square miles). This region contains both the highest (Mount Whitney) and lowest (Death Valley) surface elevations of the contiguous United States. It is bounded on the west by the crest of the Sierra Nevada and on the north by the watershed divide between Mono Lake and East Walker River drainages; on the east by Nevada and the south by the crest of the San Gabriel and San Bernardino mountains and the divide between watersheds draining south toward the Colorado River and those draining northward. The subregion includes all of Inyo County and parts of Mono, San Bernardino, Kern, and Los Angeles Counties.

This subregion contains numerous basin and range aquifers, separated by fractured hard rock zones. Although the quantity of surface water is limited in the South Lahontan hydrologic subregion, the quality is very good, being greatly influenced by snowmelt from the eastern Sierra Nevada. However, at lower elevations, groundwater and surface water quality can be degraded, both naturally from geothermal activity, and as a result of human-induced activities. Drinking water standards are most often exceeded for TDS, fluoride, and boron content.

Groundwater near the edges of valleys generally contains lower TDS content than water beneath the central part of the valleys or near dry lakes.

C 12.6.3 Colorado River Hydrologic Region

The southeast portion of California consists of the Colorado River hydrologic region, which contains 12 percent of the state's land area. The Colorado River forms most of the region's eastern boundary except for a portion of Nevada at the northeast and extends south to the Mexican border. The region includes all of Imperial County, approximately the eastern one- fourth of San Diego County, the eastern two-thirds of Riverside County, and the southeastern one-third of San Bernardino County. It includes a large portion of the Mojave Desert and has variable arid desert terrain that includes many bowl-shaped valleys, broad alluvial fans, sandy washes, and hills and mountains. Aquifers in this region are nearly all of the basin and range type.

Appendix D. Aquatic Toxicity Objectives Contained in Regional Water Board Basin Plans

Each Regional Water Board basin plan contains narrative toxicity objectives that require all waters to be maintained free of toxic substances in concentrations that produce detrimental responses in aquatic organisms. Most of the basin plans also state that all waters shall also be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in humans, plants, and terrestrial animals. Some basin plans also contain numeric objectives and implementation measures for toxicity.

The following is a summary taken from the water quality objective chapter of each Regional Water Board basin plan regarding narrative water quality objectives, specific test methods, data analyses, and program implementation for aquatic toxicity. This is an excerpt of language from the Regional Board basin plans, and so there may be other sections in the basin plans related to aquatic toxicity testing, interpretation of testing results, and compliance with aquatic water quality objectives. It is important to note that each permit is tailored to account for the details of a specific discharge and, therefore, the language between permits and corresponding basin plans may differ.

North Coast, Region 1

"3.3.16 Toxicity

Waters shall not contain toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the synergistic effect of multiple substances. Compliance with this objective shall be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Water Board.

The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same waterbody in areas unaffected by the waste discharge, or when necessary for other control water that is consistent with the requirements for "experimental water" as described in Standard Methods for the Examination of Water and Wastewater, latest edition (American Public Health Association, et al.). As a minimum, compliance with this objective shall be evaluated with a 96-hour bioassay.

In addition, effluent limits based upon bioassays of effluents will be prescribed, where appropriate. Additional numeric receiving water objectives for specific toxicants will be established as sufficient data become available and source control of toxic substances may be required.” (North Coast Basin Plan 2018, p. 3-6)

San Francisco Bay, Region 2

“3.3.18 TOXICITY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test.

There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community.

Attainment of this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, or toxicity tests (including those described in Chapter 4), or other methods selected by the Water Board. The Water Board will also consider other relevant information and numeric criteria and guidelines for toxic substances developed by other agencies as appropriate.

The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.” (San Francisco Bay Basin Plan 2017, p. 3-7)

Central Coast, Region 3

“3.3.2.1 Stream Disposal

Toxicity

All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life.

Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, toxicity bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.

Survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality conditions, shall not be less than that for the same waterbody in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with the requirements for "experimental water" as described in Standard Methods for the Examination of Water and Wastewater, latest edition. As a minimum, compliance with this objective shall be evaluated with a 96-hour bioassay.

In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances is encouraged. The discharge of wastes shall not cause concentrations of un-ionized ammonia (NH_3) to exceed 0.025 mg/L (as N) in receiving waters." (Central Coast Basin Plan 2017, p. 30)

Los Angeles, Region 4

Chapter 3: Water Quality Objectives

"Toxicity

Toxicity is the adverse response of organisms to chemical or physical agents. When the adverse response is mortality, the result is termed acute toxicity. When the adverse response is not mortality but instead reduced growth in larval organisms or reduced reproduction in adult organisms (or other appropriate measurements), a critical life stage effect (chronic toxicity) has occurred. The use of aquatic bioassays (toxicity tests) is widely accepted as a valid approach to evaluating toxicity of waste and receiving waters.

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in, human, plant, animal, or aquatic life.

Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the State or Regional Board.

The survival of aquatic life in surface waters, subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same waterbody in areas unaffected by the waste discharge or, when necessary, other control water.

There shall be no acute toxicity in ambient waters, including mixing zones. The acute toxicity objective for discharges dictates that the average survival in undiluted effluent for any three consecutive 96-hour static or continuous flow bioassay tests shall be at least 90%, with no single test having less than 70% survival when using an established USEPA, State Board, or other protocol authorized by the Regional Board.

There shall be no chronic toxicity in ambient waters outside mixing zones. To determine compliance with this objective, critical life stage tests for at least three species with approved testing protocols shall be used to screen for the most sensitive species. The test species used for screening shall include a vertebrate, an invertebrate, and an aquatic plant. The most sensitive species shall then be used for routine monitoring. Typical *endpoints for chronic toxicity tests include hatchability, gross morphological abnormalities, survival, growth, and reproduction."*

Effluent limits for specific toxicants can be established by the Regional Board to control toxicity identified under Toxicity Identification Evaluations (TIEs)." (Los Angeles Basin Plan 2013, p. 3- 38)

Central Valley, Region 5

"3.1.20 Toxicity

All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. Compliance with this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests of appropriate duration or other methods as specified by the Regional Water Board.

The Regional Water Board will also consider all material and relevant information submitted by the discharger and other interested parties and numerical criteria and guidelines for toxic substances developed by the State Water Board, the California Office of Environmental Health Hazard Assessment, the State Water Board Division of Drinking Water Programs, the U.S. Food and Drug Administration, the National Academy of Sciences, the U.S. Environmental Protection Agency, and other appropriate organizations to evaluate compliance with this objective.

The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors shall not be less than that for the same water body in areas unaffected by the waste discharge, or, when necessary, for other control water that is consistent with the requirements for "experimental water" as described in *Standard Methods for the Examination of Water and Wastewater*, latest edition. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay.

In addition, effluent limits based upon acute biotoxicity tests of effluents will be prescribed where appropriate; additional numerical receiving water quality objectives for specific toxicants will be established as sufficient data become available; and source control of toxic substances will be encouraged." (Central Valley Basin Plan 2018, p. 3-15)

Lahontan, Region 6

Chapter 3: Water Quality Objectives

"Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration and/or other appropriate methods as specified by the Regional Board.

The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary, for other control water that is consistent

with the requirements for "experimental water" as defined in *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, et al. 2012, or subsequent editions)." (Lahontan Region Basin Plan 2016, p. 3-6)

Narrative and Numerical Objectives

"For **acute toxicity**, compliance shall be determined by short-term toxicity tests on undiluted effluent using an established protocol (e.g., American Society for Testing and Materials [ASTM], American Public Health Association, USEPA, State Board).

For **chronic toxicity**, compliance shall be determined using the critical life stage (CLS) toxicity tests. At least three approved species shall be used to measure compliance with the toxicity objective. If possible, test species shall include a vertebrate, an invertebrate, and an aquatic plant. After an initial screening period, monitoring may be reduced to the most sensitive species. Dilution and control waters should be obtained from an unaffected area of the receiving waters. For rivers and streams, dilution water should be obtained immediately upstream of the discharge. Standard dilution water can be used if the above sources exhibit toxicity greater than 1.0 Chronic Toxicity Units. All test results shall be reported to the Regional Board in accordance with the "Standardized Reporting Requirements for Monitoring Chronic Toxicity" (State Board Publication No. 93-2 WQ). (Lahontan Region Basin Plan 2016, p. 3-16 – 3-17)

Colorado River, Region 7

Chapter 3: Water Quality Objectives

II. General Surface Water Objectives

"C. TOXICITY 1

All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in human, plant, animal, or indigenous aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, 96-hour bioassay or bioassays of appropriate duration or other appropriate methods as specified by the Regional Board. Effluent limits based upon bioassays of effluent will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.

The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or other control water which is consistent with the requirements for "experimental water" as described in Standards Methods for the Examination of Water and Wastewater, 18th Edition. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay.

As described in Chapter 6, the Regional Board will conduct toxic monitoring of the appropriate surface waters to gather baseline data as time and resources allow." (Colorado River Basin Plan 2017, p. 3-2)

Santa Ana, Region 8

Chapter 4: Water Quality Objectives

"Toxic Substances

Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to level which are harmful to human health.

The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses." (Santa Ana Basin Plan 2008, p. 4-6)

San Diego, Region 9

Chapter 3: Water Quality Objectives

"TOXICITY

Toxicity is the adverse response of organisms to chemicals or physical agents.

Water Quality Objectives for Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate= duration, or other appropriate methods as specified by the Regional Board.

The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in USEPA, State Water Resources Control Board or other protocol authorized by the Regional Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay.

In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.

The Shelter Island Yacht Basin portion of San Diego Bay is designated as an impaired water body for dissolved copper pursuant to Clean Water Act section 303(d). A Total Maximum Daily Load (TMDL) has been adopted to address this impairment. See Chapters 2, Table 2-3, Beneficial Uses of Coastal Waters, San Diego Bay, footnote 3 and Chapter 7, Total Maximum Daily Loads.

Chollas Creek is designated as a water quality limited segment for dissolved copper, lead, and zinc pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapters 2, Table 2-2, Beneficial Uses of Inland Surface Waters, Footnote 3 and Chapter 7, Total Maximum Daily Loads." (San Diego Basin Plan 2016, p. 3-33)

Appendix E. Superseded Portions of the Regional Water Board Basin Plans

Each Regional Water Board basin plan contains narrative toxicity objectives for aquatic toxicity. Most Regions include a narrative water quality objective that require all waters to be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants, terrestrial animals, or aquatic organisms. Some basin plans also contain implementation measures for toxicity. The Provisions would supersede basin plan provisions to the extent that they specify methods of assessing compliance with any numeric or narrative toxicity water quality objective, or specific toxicity testing and/or interpretation of toxicity testing data. The Provisions would not supersede the existing narrative toxicity water quality objectives.

The following is excerpts from each existing Regional Water Board basin plan regarding narrative water quality objectives, specific test methods, data analyses, and programs implementation for aquatic toxicity, and an indication of the language that will be superseded (in strike out or underline) to the extent of any conflict. It is important to note that there may be sections of the basin plans that would conflict with the Provisions only when applied to aquatic toxicity that are not shown in strikeout below. For purposes of the appendix, a footnote has been added to indicate the potential conflict. Other sections are not reflected below.

North Coast, Region 1

"3.3.16 Toxicity

Waters shall not contain toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the synergistic effect of multiple substances. Compliance with this objective shall be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Water Board. [9]

~~The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same waterbody in areas unaffected by the waste discharge, or when necessary for other control water that is consistent with the requirements for "experimental water" as described in Standard Methods for the Examination of Water and Wastewater, latest edition (American Public~~

[9] This sentence has been superseded to the extent that it is applied to aquatic toxicity.

~~Health Association, et al.). As a minimum, compliance with this objective shall be evaluated with a 96-hour bioassay.~~

In addition, effluent limits based upon bioassays of effluents will be prescribed, where appropriate. Additional numeric receiving water objectives for specific toxicants will be established as sufficient data become available and source control of toxic substances may be required." (North Coast Basin Plan 2018, p. 3-6)

San Francisco Bay, Region 2

"3.3.18 TOXICITY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. ~~Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species.~~ There shall be no acute toxicity in ambient waters. ~~Acute toxicity is defined as a median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test.~~

There shall be no chronic toxicity in ambient waters. ~~Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community.~~

~~Attainment of this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, or toxicity tests (including those described in Chapter 4), or other methods selected by the Water Board. The Water Board will also consider other relevant information and numeric criteria and guidelines for toxic substances developed by other agencies as appropriate.~~

~~The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors."~~ (San Francisco Bay Basin Plan 2017, p. 3-7)

~~"4.5.5.3 Whole Effluent Toxicity Limits and Control Program~~

~~The narrative water quality objective for toxicity (see Chapter 3) protects beneficial uses against mixtures of pollutants typically found in aquatic systems. This approach is used because numerical objectives for individual pollutants do not take mixtures into account and because numerical objectives exist for only a small fraction of potential pollutants of concern.~~

~~Effluent limits for acute toxicity are described below and were derived through the Effluent Toxicity Characterization Program (ETCP). A detailed description of the ETCP is presented later in this section. These limits define in specific terms how the Water Board assesses whether waters are "maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms" (the narrative objective in Chapter 3) and maintains waters free of "toxic substances in toxic amounts" (Clean Water Act)."~~ (San Francisco Bay Basin Plan 2017, p. 4-12)

~~*"4.5.5.3.1 Acute Toxicity*~~

~~The acute toxicity effluent limitation states that the survival of organisms in effluent shall be a median value of not less than 90 percent survival, and a 90 percentile value of not less than 70 percent survival using tests as specified in Table 4-3 and Table 4-4. Compliance with the acute toxicity limitation is evaluated by measuring survival of test fishes exposed to effluent for 96 hours. Each fish species represents a single sample. Dischargers are required to conduct flow- through effluent toxicity tests, except for those that discharge intermittently and discharge less than 1.0 million gallons per day (average dry weather flow). Such small, intermittent dischargers are required to perform static renewal bioassays.~~

~~All dischargers perform toxicity tests using fish species, according to protocols approved by the U.S. EPA or State Board or published by the American Society for Testing and Materials (ASTM) or American Public Health Association. Two fish species shall be tested concurrently. These shall be the most sensitive two species determined from concurrent screening(s) of three species: threespine stickleback, rainbow trout, and fathead minnow. Tests completed within ten days of the initial test are considered concurrent. This three-species-screening requirement can be met using either flow-through or static renewal bioassays.~~

~~The Water Board may consider allowing compliance monitoring with only one (the most sensitive, if known) fish species, if the following condition is met: The discharger can document that the acute toxicity limitation, specified above, has not been exceeded during the previous three years, or that acute toxicity has been observed in only one of two fish species.~~

~~The Water Board may modify the flow-through bioassay requirements and the specific test species requirements on a case-by-case basis for discharges of once-through cooling water or excessively saline wastes, which make the implementation of these test requirements impractical. Such changes are not intended as a reduction in the acute toxicity limitation, but rather to account for the technical difficulties of performing the tests.~~

~~In addition, for deep water discharges subject to marine effluent limitations, dischargers are not to be considered out of compliance with the acute toxicity effluent limitation under the following circumstances: the discharger documents that the only cause of acute toxicity is ammonia which rapidly decays in the receiving water, and demonstrates that ammonia~~

~~in the discharge does not impact water quality or beneficial uses.”~~ (San Francisco Bay Basin Plan 2017, p. 4-12 – 4-13)

~~*“4.5.5.3.2 Chronic Toxicity*~~

~~Chronic toxicity effluent limits are derived for individual dischargers based upon Best Professional Judgment. Some of the factors that may be considered in the development of these limits include: allowing credit for dilution comparable to those allowed for numeric chemical specific objectives, effluent variability, and intent to protect against consistent chronic toxicity and severe episodic toxic events.~~

~~Chronic toxicity limitations are contained in the permits of all dischargers that have completed or are currently participating in the Effluent Toxicity Characterization Program (ETCP). This includes all municipal facilities with pre-treatment programs, all major industrial facilities, and selected treated groundwater dischargers.~~

~~Monitoring requirements for chronic toxicity, such as test species, effluent sampling procedures, dilution series, monitoring frequency, dilution waters and reference toxicant testing requirements, are specified in NPDES permits on a case-by-case basis. Monitoring requirements will be based on Effluent Toxicity Characterization Program data. Test species and protocols will be selected from those listed in Table 4-5.~~

~~Dischargers with chronic toxicity limits in their permits monitoring quarterly or less frequently are required to accelerate the frequency to monthly (or as otherwise specified by the Executive Officer) when conditions such as those listed in Table 4-5 occur.~~ (San Francisco Bay Basin Plan 2017, p. 4-13)

~~*“4.5.5.3.3 Toxicity Identification/Reduction Evaluation (TIE/TRE)*~~

~~Permits shall require that if consistent toxicity is exhibited, then a chronic toxicity identification evaluation (TIE) and toxicity reduction evaluation (TRE) shall be conducted. Specific language in permits requires the development of workplans for implementing TIEs. TIEs will be initiated within 30 days of detection of persistent toxicity. The purpose of a TIE is to identify the chemical or combination of chemicals causing the observed toxicity. Every reasonable effort using currently available TIE methodologies shall be employed by the discharger. The Water Board recognizes that identification of causes of chronic toxicity may not be successful in all cases.~~

~~The purposes of a TRE are to identify the source(s) of the toxic constituents and evaluate alternative strategies for reducing or eliminating their discharge. The TRE shall include all reasonable steps to reduce toxicity to the required level. In addition, the Water Board will review chronic toxicity test results to assess acute toxicity and consider the need for an acute TIE.~~

~~Following completion of the TRE, if consistent toxicity is still exhibited in a discharge, then the discharger shall pursue all feasible waste minimization measures at a level that is~~

~~acceptable to the Water Board. The discharger must document that the acceptable level of participation is maintained by submitting reports on a specified schedule to the Water Board.~~

~~A Toxicity Reduction Evaluation may again be required in situations where chronic toxicity still exists and new techniques for identifying and reducing toxicity become available. Alternatively, the cause of effluent toxicity may change, so that existing techniques will enable identification and reduction of toxicity.~~

~~Consideration of any enforcement action by the Water Board for violation of the effluent limitation will be based in part on the discharger's actions in identifying and reducing sources of persistent toxicity."~~ (San Francisco Bay Basin Plan 2017, p. 4-14)

"4.5.5.3.4 Effluent Toxicity Characterization Program

The Effluent Toxicity Characterization Program was initiated in 1986 with the goal of developing and implementing toxicity limits for each discharger based on actual characteristics of both receiving waters and waste streams. The Water Board initiated the program as a means of implementing the narrative objective prohibiting toxic effects in receiving water.

The first two phases of the program focused on developing methods for monitoring effluent toxicity (known as effluent characterization) and deriving the appropriate series of tests to ensure that each effluent and its immediate receiving waters are not toxic to aquatic organisms. Information from these phases is used to determine whether the narrative objectives are being met in each segment of the Bay and will support the development of site-specific water quality objectives and wasteload allocations.

As the program progresses, the Water Board may: (a) Modify existing effluent limits; (b) Specify different test organisms and methods for determining compliance with toxicity effluent limits; and/or (3) Require a toxicity reduction evaluation (TRE) to determine the cost-effectiveness of controlling toxicity or reducing concentrations of specific pollutants. This program is being implemented within the existing framework of the NPDES permitting program for municipal and industrial facilities.

The purposes of effluent characterization are to:

- Define effluent variability so that the most appropriate compliance monitoring program can be put in place for each discharge and so that adequate information can be developed to determine if treatment processes or source control modifications are necessary to comply with effluent limits;

- Define the sensitivity of different test species to different effluents so that appropriate acute toxicity effluent limits can be defined and to identify the most sensitive of a group of test organisms used for compliance monitoring; and

- Define the chronic toxicity of the effluent to different test species such that the most sensitive organism of a standard set can be defined and either used for compliance monitoring or used for development of application factors to be applied to the acute toxicity effluent limit.

Two rounds of effluent characterization have been completed by dischargers selected on the basis of the nature, volume, and location of discharge. The first round started characterization in 1988; the second round in 1991. The Water Board adopted guidance documents for each round of characterization, with modifications made to the second round from knowledge gained during the first. Status reports were issued in July 1989, March 1990, and July 1991. A summary report is scheduled upon completion of the second round in 1995. The need for a third round of characterization will be evaluated at that time.

Thus far, no one test species has consistently been the most sensitive to all discharges. This strongly supports the current approach of requiring screening using several test species. Also, acute toxicity has been observed at several sites using the expanded range of test species.

Although these sites can meet existing limits with test species currently used to determine compliance (fathead minnow, trout, and stickleback), they cannot meet the limits based on more sensitive species now available.

(San Francisco Bay Basin Plan 2017)

~~Detailed technical guidelines for conducting toxicity tests and analyzing resulting data were compiled in "Modified Guidelines: Effluent Toxicity Characterization Program," San Francisco Bay Regional Water Quality Control Board, 1991, Resolution No. 91-083, after experience gained during the first round. This document is incorporated by reference into this plan."~~ (San Francisco Bay Basin Plan 2017, p. 4-14 – 4-15)

~~Table 4-4: Critical Life Stage Toxicity Test Species and Protocols~~[1]

~~**Species**~~	~~**Biological Effects**~~	~~**California**~~	~~**Lab v. Wild**~~
~~**FRESHWATER**~~			
~~Ceriodaphnia sp. (crustacean)~~	~~survival, reproduction~~	~~N~~	~~Lab~~
~~Pimephales promelas (fathead minnow)~~	~~survival, growth~~	~~Y~~	~~Lab~~
~~Selenastrum capricornutum~~	~~cell division rate~~	~~N~~	~~Lab~~
~~**MARINE**~~			
~~Mysidopsis bahia (crustacean)~~	~~survival, growth, fecundity~~	~~N~~	~~Lab~~
~~**Molluscs**~~			

~~Mytilus edulis (mussel)~~ ~~Crassostrea gigas (oyster)~~ ~~Halotis refescens (abolone)~~	~~embryo development~~	~~Y~~	~~Wild or Field~~
~~**Echinoderms**~~ ~~Strongylocentrotus purpuratus, S. franciscanus (urchin)~~ ~~Dendraster excentricus (sand dollar)~~	~~fertilization success~~	~~Y~~	~~Wild~~
~~**Diaton Plants**~~ ~~Skeletonema costatum~~ ~~Thalassiosira pseudonana~~	~~cell division rate~~	~~Y~~	~~Lab~~
~~Macrocystis pyrifera (giant kelp)~~	~~percent germination, germ~~	~~Y~~	~~Wild~~
~~Chamoia parvula (red algae)~~	~~number of cystocarps~~	~~N~~	~~Lab~~
~~**MARINE/BRACKISH**~~			
~~Menidia beryline~~	~~Survival, larval growth~~	~~Y~~	~~Lab~~

~~[1] All technical references and discussions are contained in "Modified Guidelines: Effluent Toxicity Characterization Program," San Francisco Bay Regional Water Quality Control Board, September 1991.~~

(San Francisco Bay Basin Plan 2017)

~~**Table 4-5: Conditions that Require Monthly Monitoring of Toxicity Levels**~~

~~Discharger Monitoring Frequency~~	~~Shallow Water~~	~~Deep Water~~
~~**QUARTERLY**~~		
~~Three-sample median~~ [1]	~~>1 TUc~~	~~>10~~
~~Single-sample maximum~~	~~>2 TUc~~	~~>20~~
~~**SEMI-ANNUALLY or ANNUALLY**~~		
~~Single-sample maximum~~	~~>1 TUc~~	~~>10~~

~~[1] Exceedances of the three-sample median is defined as follows: If one of the past two or fewer samples shows greater than the toxicity threshold listed above, then a chronic toxicity value greater than the threshold on the next sample represents exceedance.~~

(San Francisco Bay Basin Plan 2017)

Central Coast, Region 3

"Toxicity

All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life.

Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, toxicity bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board. [10]

~~Survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality conditions, shall not be less than that for the same waterbody in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with the requirements for "experimental water" as described in Standard Methods for the Examination of Water and Wastewater, latest edition. As a minimum, compliance with this objective shall be evaluated with a 96-hour bioassay.~~

In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances is encouraged. The discharge of wastes shall not cause concentrations of un-ionized ammonia (NH3) to exceed 0.025 mg/L (as N) in receiving waters." (Central Coast Basin Plan 2017, p. 30)

Los Angeles, Region 4

Chapter 3: Water Quality Objectives

"Toxicity

~~Toxicity is the adverse response of organisms to chemical or physical agents. When the adverse response is mortality, the result is termed acute toxicity. When the adverse response is not mortality but instead reduced growth in larval organisms or reduced reproduction in adult organisms (or other appropriate measurements), a critical life stage effect (chronic toxicity) has occurred. The use of aquatic bioassays (toxicity tests) is widely accepted as a valid approach to evaluating toxicity of waste and receiving waters.~~

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in, human, plant, animal, or aquatic life.

Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the State or Regional Board. [11]

~~The survival of aquatic life in surface waters, subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same waterbody in areas unaffected by the waste discharge or, when necessary, other control water.~~

There shall be no acute toxicity in ambient waters, including mixing zones. ~~The acute~~

[10] This sentence has been superseded to the extent that it applies to aquatic toxicity.
[11] This sentence has been superseded to the extent that it applies to aquatic toxicity.

~~*toxicity objective for discharges dictates that the average survival in undiluted effluent for any three consecutive 96-hour static or continuous flow bioassay tests shall be at least 90%, with no single test having less than 70% survival when using an established USEPA, State Board, or other protocol authorized by the Regional Board.*~~

There shall be no chronic toxicity in ambient waters outside mixing zones. ~~*To determine compliance with this objective, critical life stage tests for at least three species with approved testing protocols shall be used to screen for the most sensitive species. The test species used for screening shall include a vertebrate, an invertebrate, and an aquatic plant. The most sensitive species shall then be used for routine monitoring. Typical endpoints for chronic toxicity tests include hatchability, gross morphological abnormalities, survival, growth, and reproduction."*~~

Effluent limits for specific toxicants can be established by the Regional Board to control toxicity identified under Toxicity Identification Evaluations (TIEs)." (Los Angeles Basin Plan 2013, p. 3- 38)

Central Valley, Region 5

"3.1.20 Toxicity

All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. Compliance with this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests of appropriate duration or other methods as specified by the Regional Water Board. [12]

The Regional Water Board will also consider all material and relevant information submitted by the discharger and other interested parties and numerical criteria and guidelines for toxic substances developed by the State Water Board, the California Office of Environmental Health Hazard Assessment, the State Water Board Division of Drinking Water Programs, the U.S. Food and Drug Administration, the National Academy of Sciences, the U.S. Environmental Protection Agency, and other appropriate organizations to evaluate compliance with this objective. [13]

~~The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors shall not be less than that for the same water body in areas unaffected by the waste discharge, or, when necessary, for other control water that is consistent with the requirements for "experimental water" as described in *Standard Methods for the Examination of Water and Wastewater*, latest edition. As a minimum,~~

[12] This sentence has been superseded to the extent that it applies to aquatic toxicity.
[13] This sentence has been superseded to the extent that it applies to aquatic toxicity.

~~compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay.~~

In addition, effluent limits based upon acute biotoxicity tests of effluents will be prescribed where appropriate; additional numerical receiving water quality objectives for specific toxicants will be established as sufficient data become available; and source control of toxic substances will be encouraged." (Central Valley Basin Plan 2018, p. 3-15)

Lahontan, Region 6

Chapter 3: Water Quality Objectives

"Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration and/or other appropriate methods as specified by the Regional Board. [14]

~~The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary, for other control water that is consistent with the requirements for "experimental water" as defined in *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, et al. 2012, or subsequent editions).~~" (Lahontan Region Basin Plan 2016, p. 3-6)

"References to Taste and Odor, Human Health and Toxicity (also see "acute toxicity" and "chronic toxicity," below)

In determining compliance with objectives including references to Taste and Odor, Human Health or Toxicity, the Regional Board will consider as evidence relevant and scientifically valid water quality goals from sources such as drinking water standards from the California Department of Public Health (State "Action Levels"), the National Interim Drinking Water Standards, Proposition 65 Lawful Levels, National Ambient Water Quality Criteria, the National Academy of Sciences' Suggested No-Adverse-Response Levels (SNARLs), USEPA's Health and Water Quality Advisories, USEPA's National Toxicity Rule and California Toxicity Rule, as well as other relevant and scientifically valid evidence." [15](Lahontan Region Basin Plan 2016, p. 3-15)

~~"For **acute toxicity**, compliance shall be determined by short-term toxicity tests on~~

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[14] This sentence has been superseded to the extent that it applies to aquatic toxicity.
[15] This sentence has been superseded to the extent that it applies to aquatic toxicity.

~~undiluted effluent using an established protocol (e.g., American Society for Testing and Materials [ASTM], American Public Health Association, USEPA, State Board).~~

~~For~~ **~~chronic toxicity~~**~~, compliance shall be determined using the critical life stage (CLS) toxicity tests. At least three approved species shall be used to measure compliance with the toxicity objective. If possible, test species shall include a vertebrate, an invertebrate, and an~~

~~aquatic plant. After an initial screening period, monitoring may be reduced to the most sensitive species. Dilution and control waters should be obtained from an unaffected area of the receiving waters. For rivers and streams, dilution water should be obtained immediately upstream of the discharge. Standard dilution water can be used if the above sources exhibit toxicity greater than 1.0 Chronic Toxicity Units. All test results shall be reported to the Regional Board in accordance with the "Standardized Reporting Requirements for Monitoring Chronic Toxicity (State Board Publication No. 93-2 WQ)."~~ (Lahontan Region Basin Plan 2016, p. 3-16 – 3-17)

Chapter 5: Water Quality Standards and Control Measures for the Lake Tahoe Basin

"Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration and/or other appropriate methods as specified by the Regional Board. [16]

~~The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary, for other control water that is consistent with the requirements for "experimental water" as defined in~~ ~~*Standard Methods for the Examination of Water and Wastewater*~~ ~~(American Public Health Association, et al. 1998).~~" (Lahontan Region Basin Plan 2016, p. 5.1-8)

"References to Taste and Odor, Human Health and Toxicity (also see "acute toxicity" and "chronic toxicity," below):

In determining compliance with objectives including references to Taste and Odor, Human Health or Toxicity, the Regional Board will consider as evidence relevant and scientifically valid water quality goals from sources such as drinking water standards from the California Department of Health Services (State "Action Levels"), the National Interim Drinking Water

[16] This sentence has been superseded to the extent that it applies to aquatic toxicity.

Standards, Proposition 65 Lawful Levels, National Ambient Water Quality Criteria (USEPA's "Quality Criteria for Water" for the years 1986, 1976 and 1972; "Ambient Water Quality Criteria," volumes 1980, 1984, 1986, 1987 and 1989), the National Academy of

Sciences' Suggested No-Adverse- Response Levels (SNARL), USEPA's Health and Water Quality Advisories, as well as other relevant and scientifically valid evidence." [17](Lahontan Region Basin Plan 2016, p. 5.1-11)

"~~For **acute toxicity**, compliance shall be determined by short-term toxicity tests on undiluted effluent using an established protocol (e.g., American Society for Testing and Materials [ASTM], American Public Health Association, USEPA, State Board).~~

~~For **chronic toxicity**, compliance shall be determined using the critical life stage (CLS) toxicity tests. At least three approved species shall be used to measure compliance with the toxicity objective. If possible, test species shall include a vertebrate, an invertebrate, and an aquatic plant. After an initial screening period, monitoring may be reduced to the most sensitive species. Dilution and control waters should be obtained from an unaffected area of the receiving waters. For rivers and streams, dilution water should be obtained immediately upstream of the discharge. Standard dilution water can be used if the above sources exhibit toxicity greater than 1.0 Chronic Toxicity Units. All test results shall be reported to the Regional Board in accordance with the "Standardized Reporting Requirements for Monitoring Chronic Toxicity" (State Board Publication No. 93-2 WQ)."~~ (Lahontan Region Basin Plan 2016, p. 5.1-12 – 5.1-13)

Colorado River, Region 7

Chapter 3: Water Quality Objectives

II. General Surface Water Objectives

"C. TOXICITY 1

All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in human, plant, animal, or indigenous aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, 96-hour bioassay or bioassays of appropriate duration or other appropriate methods as specified by the Regional Board.[18] Effluent limits based upon bioassays of effluent will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.

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[17] This sentence has been superseded to the extent that it applies to aquatic toxicity.
[18] This sentence has been superseded to the extent that it applies to aquatic toxicity.

The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge.[19]~~, or other control water which is consistent with the requirements for "experimental water" as described in Standards Methods for the Examination of Water and Wastewater, 18th Edition. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay.~~

As described in Chapter 6, the Regional Board will conduct toxic monitoring of the appropriate surface waters to gather baseline data as time and resources allow." (Colorado River Basin Plan 2017, p. 3-2)

Chapter 4: Implementation

IV. Specific Implementation Actions

"C. TOXICITY OBJECTIVE COMPLIANCE

Compliance with the Regional Board's toxicity objective (see Chapter 3) will be determined through the use of bioassays utilizing standard/approved methodology. A three part biomonitoring program to determine compliance is described in Chapter 6 (Section II.B.). Compliance may also be determined by reviewing data generated by the Toxic Substances Monitoring Program (see Chapter 6, Section II.E.) and other water quality monitoring programs. Implementation measures to address violations of the toxicity objective will be conducted in compliance with applicable state and federal policies and regulations." [20] (Colorado River Basin Plan 2017, p. 4-19)

Chapter 6 – Surveillance, Monitoring and Water Quality Assessment

II. Regional Board Monitoring

B. Compliance Monitoring

"2. Recommended Biomonitoring (Toxicity Monitoring) Programs

Compliance with the Regional Board's toxicity objective (see Chapter 3) will be determined through the use of bioassays utilizing standard/approved methodology. For an initial two-year period, biomonitoring will be conducted primarily for informational purposes. The resulting data will be utilized to determine a specific compliance protocol, including methodology and enforcement procedures. Dischargers whose NPDES permits do not include biomonitoring requirements will be encouraged to voluntarily conduct bioassays during this initial two-year period to assist in developing said protocol.

[19] The underlined portion of this sentence was shown in strikeout formatting in the 2018 Draft Staff Report, but is now shown in non-strikeout (no longer considered to be superseded by the Toxicity Provisions).

[20] This section has been superseded to the extent that it applies to aquatic toxicity.

Dischargers who wish to experiment with other methods of determining toxicity compliance are welcome to do so and may submit such data to the Regional Board for review and consideration.

Although this initial two-year period would be utilized primarily to collect information, it would not preclude the possibility of enforcement action in cases where significant toxicity is exhibited.

Such enforcement would be considered by the Regional Board on a case by case basis.

Pending appropriations of adequate resources, the following three biomonitoring programs are recommended for implementation:

Program A

Bioassay Type: Chronic

Frequency: Quarterly

Sampling Locations:

1. Colorado River near California/Nevada State Line
2. Palo Verde Outfall Drain near South Highway 78 Crossing
3. Colorado River at Imperial Dam
4. Reservation Main Drain near Outlet
5. Colorado River above Morelos Dam
6. Alamo River near International Boundary
7. New River near International Boundary
8. Central Drain near Outlet
9. Holtville Main Drain
10. Alamo River near Outlet
11. New River near Outlet
12. Whitewater River above MWD Outfall
13. Coachella Valley Storm Water Channel at Lincoln Street Crossing

The above-listed sites represent the more important waterways in the Region in regard to flow. Where chronic toxicity is exhibited at any of the above monitoring locations, an investigation would follow to determine the source of the toxicity.

Program B

Bioassay Type: Chronic

Frequency: Annually

Sampling Locations:

1. Tahquitz Creek
2. Twin Pines Creek
3. Boundary Creek
4. Walker Creek

5. Tule Creek
6. Mission Creek
7. Carrizo Creek
8. Big Morongo Creek
9. Banner Creek
10.Little Morongo
Creek 11.San
Felipe Creek
12.Arrastre Creek
13.Borrego Palm Canyon
Creek 14.Coyote Creek
15.Salt Creek

Where chronic toxicity is exhibited at any of the above monitoring locations, an investigation would follow to determine the source of the toxicity.

Program C

Bioassay Type: Acute and/or Chronic

Frequency: To be determined by Regional Board staff on a case-by-case basis, but shall in no case be less frequent then annually.

It is recommended that at a minimum appropriate acute/chronic toxicity bioassays be required in all new or updated NPDES permits. For future permit holders, assignment of such testing will be determined on a case-by-case basis." [21] (Colorado River Basin Plan 2017, p. 6-4 – 6-5)

Santa Ana, Region 8

Chapter 4: Water Quality Objectives

"Toxic Substances

Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to level which are harmful to human health. The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses." (Santa Ana Basin Plan 2008, p. 4-6)

Chapter 6: Monitoring and Assessment

"Compliance Monitoring (Continued from page 6-6)

The lowest concentration by which permit compliance is reliably measured is called the Practical Quantification Level (PQL). The PQL is used and taken into account when

[21] This section has been superseded to the extent that it applies to aquatic toxicity.

establishing waste discharge limits. PQLs will be developed using all available information, and will be established based upon information obtained from regional laboratories.

~~The Regional Board requires the initiation of a Toxicity Reduction Evaluation (TRE) if a discharge consistently exceeds its chronic toxicity effluent limit. The Regional Board, to date, has interpreted the "consistency exceeds" trigger as the failures of three successive monthly toxicity tests, each conducted on separate samples. Initiation of the TRE has also been conditioned on a determination that a sufficient level of toxicity exists to permit effective application of the analytical techniques required by a TRE. The Regional Board also encourages the development of scientifically sound toxicity test quality control and standardized interpretation criteria to improve the accuracy and reliability of chronic toxicity demonstrations.~~

Compliance monitoring also involves staff inspections of regulated and unregulated sites and includes observations made by staff members and/or results of analyses performed on samples collected by staff members." (Santa Ana Basin Plan 2008, p. 6-18)

San Diego, Region 9

Chapter 3: Water Quality Objectives

"TOXICITY

Toxicity is the adverse response of organisms to chemicals or physical agents.

Water Quality Objectives for Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board. [22]

~~The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in USEPA, State Water Resources Control Board or other protocol authorized by the Regional Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay.~~

In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be

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[22] This sentence has been superseded to the extent that it applies to aquatic toxicity.

established as sufficient data become available, and source control of toxic substances will be encouraged.

The Shelter Island Yacht Basin portion of San Diego Bay is designated as an impaired water body for dissolved copper pursuant to Clean Water Act section 303(d). A Total Maximum Daily Load (TMDL) has been adopted to address this impairment. See Chapters 2, Table 2-3, Beneficial Uses of Coastal Waters, San Diego Bay, footnote 3 and Chapter 7, Total Maximum Daily Loads.

Chollas Creek is designated as a water quality limited segment for dissolved copper, lead, and zinc pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapters 2, Table 2-2, Beneficial Uses of Inland Surface Waters, Footnote 3 and Chapter 7, Total Maximum Daily Loads." (San Diego Basin Plan 2016, p. 3-33).

Appendix F. Impairments

In the 2014 and 2016 California Integrated Report (approved by U.S. EPA in July 2015), 327 California water bodies are listed as impaired because of known or unknown toxicity. These waters are presented below.

Table F-1. 2014 and 2016 Listing of water bodies impaired for toxicity, taken from The California Integrated Report

Region	Water Body Name	Water Body Type	Size	Unit
2 - San Francisco Bay Region	Oakland Inner Harbor (Fruitvale Site, part of SF Bay, Lower)	Bay & Harbor	0.93	Acres
2 - San Francisco Bay Region	Islais Creek	Estuary	45.93	Acres
2 - San Francisco Bay Region	San Mateo Creek, Lower	River & Stream	5.84	Miles
2 - San Francisco Bay Region	Guadalupe Slough	River & Stream	6.72	Miles
2 - San Francisco Bay Region	Kirker Creek	River & Stream	8.03	Miles
2 - San Francisco Bay Region	Mt. Diablo Creek	River & Stream	13.96	Miles
2 - San Francisco Bay Region	Permanente Creek	River & Stream	14.01	Miles
2 - San Francisco Bay Region	Stevens Creek	River & Stream	20.86	Miles
2 - San Francisco Bay Region	Coyote Creek (Santa Clara Co.)	River & Stream	58.42	Miles
3 - Central Coast Region	Monterey Harbor	Bay & Harbor	75.99	Acres
3 - Central Coast Region	Moss Landing Harbor	Bay & Harbor	79.27	Acres
3 - Central Coast Region	Santa Maria River Estuary	Estuary	5.61	Acres
3 - Central Coast Region	Pajaro River Estuary	Estuary	24.00	Acres
3 - Central Coast Region	Moro Cojo Slough	Estuary	62.49	Acres
3 - Central Coast Region	Salinas River Lagoon (North)	Estuary	196.61	Acres
3 - Central Coast Region	Oso Flaco Lake	Lake & Reservoir	46.26	Acres
3 - Central Coast Region	Merrit Ditch	River & Stream	0.45	Miles
3 - Central Coast Region	Espinosa Slough	River & Stream	0.99	Miles
3 - Central Coast Region	Bell Creek (Santa Barbara Co)	River & Stream	1.03	Miles
3 - Central Coast Region	Blosser Channel	River & Stream	1.67	Miles
3 - Central Coast Region	Millers Canal	River & Stream	2.10	Miles

Region	Water Body Name	Water Body Type	Size	Unit
3 - Central Coast Region	Little Oso Flaco Creek	River & Stream	2.17	Miles
3 - Central Coast Region	Carpinteria Creek (below Gobernador Creek)	River & Stream	2.31	Miles
3 - Central Coast Region	McGowan Ditch	River & Stream	2.53	Miles
3 - Central Coast Region	Salsipuedes Creek (Santa Cruz County)	River & Stream	2.63	Miles
3 - Central Coast Region	Struve Slough	River & Stream	2.78	Miles
3 - Central Coast Region	Franklin Creek (Santa Barbara County)	River & Stream	2.90	Miles
3 - Central Coast Region	Bradley Channel	River & Stream	3.07	Miles
3 - Central Coast Region	Main Street Channel	River & Stream	3.34	Miles
3 - Central Coast Region	Tembladero Slough	River & Stream	3.40	Miles
3 - Central Coast Region	Old Salinas River	River & Stream	3.83	Miles
3 - Central Coast Region	Greene Valley Creek (Santa Barbara County)	River & Stream	3.91	Miles
3 - Central Coast Region	Quail Creek	River & Stream	4.16	Miles
3 - Central Coast Region	Unnamed tributary to Orcutt Creek	River & Stream	4.47	Miles
3 - Central Coast Region	Glen Annie Canyon Creek	River & Stream	4.81	Miles
3 - Central Coast Region	Oso Flaco Creek	River & Stream	5.15	Miles
3 - Central Coast Region	Arroyo Paredon	River & Stream	5.33	Miles
3 - Central Coast Region	Atascadero Creek (Santa Barbara County)	River & Stream	5.67	Miles
3 - Central Coast Region	Canada Del Capitan	River & Stream	5.80	Miles
3 - Central Coast Region	Watsonville Slough	River & Stream	6.20	Miles
3 - Central Coast Region	Prefumo Creek	River & Stream	6.24	Miles
3 - Central Coast Region	Santa Ynez River (below city of Lompoc to Ocean)	River & Stream	6.71	Miles
3 - Central Coast Region	Natividad Creek	River & Stream	7.16	Miles
3 - Central Coast Region	San Juan Creek (San Benito Co)	River & Stream	7.30	Miles

Region	Water Body Name	Water Body Type	Size	Unit
3 - Central Coast Region	Tequisquita Slough	River & Stream	7.33	Miles
3 - Central Coast Region	Alamo Creek	River & Stream	7.80	Miles
3 - Central Coast Region	Mission Creek (Santa Barbara County)	River & Stream	8.70	Miles
3 - Central Coast Region	Blanco Drain	River & Stream	9.17	Miles
3 - Central Coast Region	Gabilan Creek	River & Stream	9.52	Miles
3 - Central Coast Region	Orcutt Creek	River & Stream	10.00	Miles
3 - Central Coast Region	San Miguelito Creek	River & Stream	10.11	Miles
3 - Central Coast Region	Rincon Creek	River & Stream	10.17	Miles
3 - Central Coast Region	Alisal Slough (Monterey County)	River & Stream	10.93	Miles
3 - Central Coast Region	Salinas Reclamation Canal	River & Stream	12.88	Miles
3 - Central Coast Region	Alisal Creek (Monterey County)	River & Stream	12.94	Miles
3 - Central Coast Region	Arroyo Grande Creek (below Lopez Lake)	River & Stream	13.20	Miles
3 - Central Coast Region	Chualar Creek	River & Stream	14.00	Miles
3 - Central Coast Region	Chorro Creek	River & Stream	14.27	Miles
3 - Central Coast Region	Bradley Canyon Creek	River & Stream	16.54	Miles
3 - Central Coast Region	Santa Ynez River (above Lake Cachuma)	River & Stream	22.14	Miles
3 - Central Coast Region	Santa Maria River	River & Stream	24.58	Miles
3 - Central Coast Region	Estrella River	River & Stream	28.50	Miles
3 - Central Coast Region	Pajaro River	River & Stream	31.93	Miles
3 - Central Coast Region	Salinas River (lower, estuary to near Gonzales Rd crossing, watersheds 30910 and 30920)	River & Stream	35.90	Miles
3 - Central Coast Region	Santa Ynez River (Cachuma Lake to below city of Lompoc)	River & Stream	40.72	Miles
3 - Central Coast Region	Salinas River (middle, near Gonzales Rd crossing to confluence with Nacimiento River)	River & Stream	73.43	Miles

Region	Water Body Name	Water Body Type	Size	Unit
4 - Los Angeles Region	Los Angeles Harbor - Consolidated Slip	Bay & Harbor	36.00	Acres
4 - Los Angeles Region	Los Angeles Harbor - Fish Harbor	Bay & Harbor	91.00	Acres
4 - Los Angeles Region	Marina del Rey Harbor - Back Basins	Bay & Harbor	390.91	Acres
4 - Los Angeles Region	Los Angeles/Long Beach Inner Harbor	Bay & Harbor	3003.00	Acres
4 - Los Angeles Region	Los Angeles/Long Beach Outer Harbor (inside breakwater)	Bay & Harbor	4042.00	Acres
4 - Los Angeles Region	San Pedro Bay Near/Off Shore Zones	Bay & Harbor	8173.00	Acres
4 - Los Angeles Region	Santa Clara River Estuary	Estuary	49.06	Acres
4 - Los Angeles Region	Dominguez Channel Estuary (unlined portion below Vermont Ave)	Estuary	140.00	Acres
4 - Los Angeles Region	Los Angeles River Estuary (Queensway Bay)	Estuary	207.00	Acres
4 - Los Angeles Region	Calleguas Creek Reach 1	Estuary	343.79	Acres
4 - Los Angeles Region	McGrath Lake	Lake & Reservoir	20.14	Acres
4 - Los Angeles Region	Balboa Lake	Lake & Reservoir	27.00	Acres
4 - Los Angeles Region	Calleguas Creek Reach 9A	River & Stream	1.68	Miles
4 - Los Angeles Region	Los Angeles River Reach 5 (within Sepulveda Basin)	River & Stream	1.90	Miles
4 - Los Angeles Region	Rio De Santa Clara/Oxnard Drain No. 3	River & Stream	1.92	Miles
4 - Los Angeles Region	Ballona Creek Estuary	River & Stream	2.31	Miles
4 - Los Angeles Region	Ventura River Reach 3 (Weldon	River & Stream	2.82	Miles

Region	Water Body Name	Water Body Type	Size	Unit
	Canyon to Confl. w/ Coyote Cr)			
4 - Los Angeles Region	Calleguas Creek Reach 10 (Conejo Creek (Hill Canyon)	River & Stream	2.96	Miles
4 - Los Angeles Region	South San Jose Creek (Los Angeles County)	River & Stream	3.30	Miles
4 - Los Angeles Region	Santa Clara River Reach 6 (W Pier Hwy 99 to Bouquet Cyn Rd)	River & Stream	3.57	Miles
4 - Los Angeles Region	Tapo Canyon	River & Stream	4.10	Miles
4 - Los Angeles Region	Calleguas Creek Reach 2 (estuary to Potrero Rd-)	River & Stream	4.31	Miles
4 - Los Angeles Region	Calleguas Creek Reach 5	River & Stream	4.34	Miles
4 - Los Angeles Region	Rio Hondo Reach 1 (Confl. LA River to Snt Ana Fwy)	River & Stream	4.55	Miles
4 - Los Angeles Region	Santa Clara River Reach 1 (Estuary to Hwy 101 Bridge)	River & Stream	6.06	Miles
4 - Los Angeles Region	Calleguas Creek Reach 9B	River & Stream	6.20	Miles
4 - Los Angeles Region	Ballona Creek	River & Stream	6.47	Miles
4 - Los Angeles Region	Boulder Creek (Ventura County)	River & Stream	6.50	Miles
4 - Los Angeles Region	Bull Creek (Los Angeles County)	River & Stream	6.50	Miles
4 - Los Angeles Region	Dominguez Channel (lined portion above Vermont Ave)	River & Stream	6.70	Miles
4 - Los Angeles Region	Los Angeles River Reach 6 (Above Sepulveda Flood Control Basin)	River & Stream	6.99	Miles
4 - Los Angeles Region	Calleguas Creek Reach 4	River & Stream	7.19	Miles
4 - Los Angeles Region	Los Angeles River Reach 3 (Figueroa St. to Riverside Dr.)	River & Stream	7.94	Miles
4 - Los Angeles Region	Calleguas Creek Reach 11 (Arroyo Santa Rosa)	River & Stream	8.69	Miles
4 - Los Angeles Region	Wheeler Canyon/Todd Barranca	River & Stream	10.09	Miles

Region	Water Body Name	Water Body Type	Size	Unit
4 - Los Angeles Region	Malibu Creek	River & Stream	10.85	Miles
4 - Los Angeles Region	Los Angeles River Reach 4 (Sepulveda Dr. to Sepulveda Dam)	River & Stream	11.06	Miles
4 - Los Angeles Region	Duck Pond Agricultural Drains/Mugu Drain/Oxnard Drain No 2	River & Stream	11.86	Miles
4 - Los Angeles Region	Coyote Creek	River & Stream	13.31	Miles
4 - Los Angeles Region	Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	River & Stream	13.91	Miles
4 - Los Angeles Region	Calleguas Creek Reach 6 (was Arroyo Las Posas Reaches 1 and 2 on 1998 303d list)	River & Stream	15.30	Miles
4 - Los Angeles Region	Calleguas Creek Reach 13 (Conejo Creek South Fork, was Conejo Cr Reach 4 and part of Reach 3 on 1998 303d list)	River & Stream	17.15	Miles
4 - Los Angeles Region	San Jose Creek Reach 1 (SG Confluence to Temple St.)	River & Stream	28.91	Miles
4 - Los Angeles Region	Santa Clara River Reach 3 (Freeman Diversion to A Street)	River & Stream	31.00	Miles
4 - Los Angeles Region	Piru Creek (from gaging station below Santa Felicia Dam to headwaters)	River & Stream	67.00	Miles
4 - Los Angeles Region	Colorado Lagoon	Wetland, Tidal	13.23	Acres
5 - Central Valley Region	Delta Waterways (export area)	Estuary	583.00	Acres
5 - Central Valley Region	Delta Waterways (Stockton Ship Channel)	Estuary	1603.00	Acres
5 - Central Valley Region	Delta Waterways (northwestern portion)	Estuary	2587.00	Acres

Region	Water Body Name	Water Body Type	Size	Unit
5 - Central Valley Region	Delta Waterways (eastern portion)	Estuary	2972.00	Acres
5 - Central Valley Region	Delta Waterways (southern portion)	Estuary	3125.00	Acres
5 - Central Valley Region	Delta Waterways (northern portion)	Estuary	6795.00	Acres
5 - Central Valley Region	Delta Waterways (central portion)	Estuary	11425.00	Acres
5 - Central Valley Region	Delta Waterways (western portion)	Estuary	14524.00	Acres
5 - Central Valley Region	Oroville Wildlife Area Fishing Pond (Butte County)	Lake & Reservoir	2.30	Acres
5 - Central Valley Region	Pacific Heights Pond, Lower (Butte County)	Lake & Reservoir	10.00	Acres
5 - Central Valley Region	Ramona Lake	Lake & Reservoir	17.00	Acres
5 - Central Valley Region	Ramona Lake (Fresno County)	Lake & Reservoir	28.00	Acres
5 - Central Valley Region	Mile Long Pond (Butte County)	Lake & Reservoir	84.00	Acres
5 - Central Valley Region	Grayson Drain (at outfall)	River & Stream	0.03	Miles
5 - Central Valley Region	Pleasant Grove Creek, unnamed northern tributary (from Mt Tamalpais Dr to confluence with Pleasant Grove Creek)	River & Stream	0.77	Miles
5 - Central Valley Region	Kaseberg Creek, unnamed southern tributary (from Baseline Road to Timber Creek Golf Course, Placer County)	River & Stream	1.10	Miles
5 - Central Valley Region	Pleasant Grove Creek, unnamed northern tributary (from Greywood	River & Stream	1.10	Miles

Region	Water Body Name	Water Body Type	Size	Unit
	Circle to confluence with Pleasant Grove Creek)			
5 - Central Valley Region	Turner Slough (drains into San Joaquin River (Bear Creek to Mud Slough), Merced County)	River & Stream	1.20	Miles
5 - Central Valley Region	Kaseberg Creek, unnamed eastern tributary (from Green Grove Ln to Del Webb Blvd)	River & Stream	1.30	Miles
5 - Central Valley Region	Sacramento Slough	River & Stream	1.66	Miles
5 - Central Valley Region	Coon Hollow Creek (El Dorado County)	River & Stream	1.70	Miles
5 - Central Valley Region	Potato Slough, Little (San Joaquin County)	River & Stream	2.00	Miles
5 - Central Valley Region	Ingram Creek (from confluence with San Joaquin River to confluence with Hospital Creek)	River & Stream	2.10	Miles
5 - Central Valley Region	Pleasant Grove Creek, South Branch, unnamed southeastern trib (from east of Sierra View Country Club to confl with Pleasant Grove Cr, South Branch)	River & Stream	2.30	Miles
5 - Central Valley Region	Kaseberg Creek, unnamed southeastern tributary (from Silverado Middle School to Timber Creek Golf Course, Placer County)	River & Stream	2.50	Miles
5 - Central Valley Region	Orestimba Creek (below Kilburn Road)	River & Stream	2.68	Miles
5 - Central Valley Region	Ingram Creek (from confluence with Hospital Creek to Hwy 33 crossing)	River & Stream	2.80	Miles

Region	Water Body Name	Water Body Type	Size	Unit
5 - Central Valley Region	San Joaquin River (Mud Slough to Merced River)	River & Stream	3.00	Miles
5 - Central Valley Region	San Joaquin River (Stanislaus River to Delta Boundary)	River & Stream	3.00	Miles
5 - Central Valley Region	North Canyon Creek (El Dorado County)	River & Stream	3.10	Miles
5 - Central Valley Region	Turner Slough (Merced County)	River & Stream	3.10	Miles
5 - Central Valley Region	Mustang Creek (Merced County)	River & Stream	4.20	Miles
5 - Central Valley Region	Salt Slough (Mud Slough to Sand Dam, Merced County)	River & Stream	4.50	Miles
5 - Central Valley Region	China Slough (from Leininger Road to Sacramento River, Tehama County)	River & Stream	5.20	Miles
5 - Central Valley Region	Simmerly Slough (Yuba County)	River & Stream	5.50	Miles
5 - Central Valley Region	Coon Creek, Lower (from Pacific Avenue to Main Canal, Sutter County)	River & Stream	5.80	Miles
5 - Central Valley Region	Sweany Creek (Solano County)	River & Stream	5.90	Miles
5 - Central Valley Region	Willow Slough Bypass (Yolo County)	River & Stream	6.20	Miles
5 - Central Valley Region	French Camp Slough (confluence of Littlejohns and Lone Tree Creeks to San Joaquin River, San Joaquin Co; partly in Delta Waterways, eastern portion)	River & Stream	6.32	Miles
5 - Central Valley Region	Kaseberg Creek (tributary to Pleasant Grove Creek, Placer County)	River & Stream	6.40	Miles
5 - Central Valley Region	Strong Ranch Slough	River & Stream	6.43	Miles

Region	Water Body Name	Water Body Type	Size	Unit
5 - Central Valley Region	Del Puerto Creek	River & Stream	6.47	Miles
5 - Central Valley Region	Pleasant Grove Creek, South Branch	River & Stream	7.30	Miles
5 - Central Valley Region	Bates Slough (from Avenue 200 to Deep Creek, Tulare County)	River & Stream	7.50	Miles
5 - Central Valley Region	Hamilton Slough (from south of Thermalito Afterbay to south of Biggs, Butte County)	River & Stream	7.90	Miles
5 - Central Valley Region	Chicken Ranch Slough	River & Stream	8.03	Miles
5 - Central Valley Region	San Joaquin River (Tuolumne River to Stanislaus River)	River & Stream	8.40	Miles
5 - Central Valley Region	Butte Slough	River & Stream	8.88	Miles
5 - Central Valley Region	Orestimba Creek (above Kilburn Road)	River & Stream	9.13	Miles
5 - Central Valley Region	Kaweah River (below Terminus Dam, Tulare County)	River & Stream	9.40	Miles
5 - Central Valley Region	Black Rascal Creek (Merced County)	River & Stream	9.60	Miles
5 - Central Valley Region	Ingalsbe Slough (tributary to Merced River, Merced County)	River & Stream	9.60	Miles
5 - Central Valley Region	Concow Creek (tributary to West Branch Feather River, Butte County)	River & Stream	9.70	Miles
5 - Central Valley Region	Salt Slough (upstream from confluence with San Joaquin River)	River & Stream	9.87	Miles
5 - Central Valley Region	Arcade Creek	River & Stream	9.90	Miles
5 - Central Valley Region	Sand Creek (tributary to Marsh Creek, Contra Costa County; partly in Delta Waterways, western portion)	River & Stream	10.00	Miles

Region	Water Body Name	Water Body Type	Size	Unit
5 - Central Valley Region	Willow Slough (Yolo County)	River & Stream	10.00	Miles
5 - Central Valley Region	Marsh Creek (Marsh Creek Reservoir to San Joaquin River; partly in Delta Waterways, western portion)	River & Stream	10.34	Miles
5 - Central Valley Region	Deadman Creek (Merced County)	River & Stream	11.00	Miles
5 - Central Valley Region	Elk Bayou (Tulare County)	River & Stream	11.00	Miles
5 - Central Valley Region	Gilsizer Slough (from Yuba City to downstream of Township Road, Sutter County)	River & Stream	11.00	Miles
5 - Central Valley Region	Mormon Slough (from Stockton Diverting Canal to Bellota Weir--Calaveras River)	River & Stream	11.00	Miles
5 - Central Valley Region	Pine Creek (Butte County)	River & Stream	11.00	Miles
5 - Central Valley Region	Sucker Run (Butte County)	River & Stream	11.00	Miles
5 - Central Valley Region	Elder Creek	River & Stream	11.07	Miles
5 - Central Valley Region	Curry Creek (Placer and Sutter Counties)	River & Stream	12.00	Miles
5 - Central Valley Region	Miles Creek (Merced County)	River & Stream	13.00	Miles
5 - Central Valley Region	Mud Slough, North (downstream of San Luis Drain)	River & Stream	13.00	Miles
5 - Central Valley Region	Pixley Slough (San Joaquin County; partly in Delta Waterways, eastern portion)	River & Stream	13.00	Miles
5 - Central Valley Region	Spring Creek (Colusa County)	River & Stream	13.00	Miles
5 - Central Valley Region	Yankee Slough (Placer and Sutter Counties)	River & Stream	13.00	Miles
5 - Central Valley Region	Jack Slough	River & Stream	13.79	Miles
5 - Central Valley Region	James Bypass (Fresno County)	River & Stream	14.00	Miles

Region	Water Body Name	Water Body Type	Size	Unit
5 - Central Valley Region	Kellogg Creek (Los Vaqueros Reservoir to Discovery Bay; partly in Delta Waterways, western portion)	River & Stream	14.00	Miles
5 - Central Valley Region	Poso Slough	River & Stream	14.00	Miles
5 - Central Valley Region	San Joaquin River (Bear Creek to Mud Slough)	River & Stream	14.00	Miles
5 - Central Valley Region	Highline Canal (from Mustang Creek to Lateral No 8, Merced and Stanislaus Counties)	River & Stream	14.47	Miles
5 - Central Valley Region	Lone Tree Creek	River & Stream	14.84	Miles
5 - Central Valley Region	Fresno Slough (from Graham Road to James Bypass, Fresno County)	River & Stream	15.00	Miles
5 - Central Valley Region	Lassen Creek (Modoc County)	River & Stream	15.00	Miles
5 - Central Valley Region	Mud Creek (Butte County)	River & Stream	15.00	Miles
5 - Central Valley Region	Outside Creek (Tulare County)	River & Stream	15.00	Miles
5 - Central Valley Region	Sacramento River (Keswick Dam to Cottonwood Creek)	River & Stream	15.06	Miles
5 - Central Valley Region	Sacramento River (Cottonwood Creek to Red Bluff)	River & Stream	15.62	Miles
5 - Central Valley Region	Sacramento River (Knights Landing to the Delta)	River & Stream	16.27	Miles
5 - Central Valley Region	Ulatis Creek (Solano County)	River & Stream	17.00	Miles
5 - Central Valley Region	Little Panoche Creek	River & Stream	17.63	Miles
5 - Central Valley Region	Panoche Creek (Silver Creek to Belmont Avenue)	River & Stream	17.64	Miles
5 - Central Valley Region	Walker Creek (Glenn County)	River & Stream	18.00	Miles
5 - Central Valley Region	Lone Willow Slough (Madera County)	River & Stream	19.00	Miles

Region	Water Body Name	Water Body Type	Size	Unit
5 - Central Valley Region	Packwood Creek (Tulare County)	River & Stream	19.00	Miles
5 - Central Valley Region	Hospital Creek (San Joaquin and Stanislaus Counties)	River & Stream	20.00	Miles
5 - Central Valley Region	Pleasant Grove Creek	River & Stream	20.00	Miles
5 - Central Valley Region	Berenda Creek (Madera County)	River & Stream	21.00	Miles
5 - Central Valley Region	Calaveras River, Lower (from Bellota Weir to Stockton Diverting Canal)	River & Stream	21.00	Miles
5 - Central Valley Region	Fall River, tributary to Feather River, Middle Fork (Butte and Plumas Counties)	River & Stream	22.00	Miles
5 - Central Valley Region	Mud Slough, North (upstream of San Luis Drain)	River & Stream	22.00	Miles
5 - Central Valley Region	Berenda Slough (Madera County)	River & Stream	23.00	Miles
5 - Central Valley Region	Burch Creek (Tehama County)	River & Stream	24.00	Miles
5 - Central Valley Region	Dry Creek (Madera County)	River & Stream	24.00	Miles
5 - Central Valley Region	Laguna Creek (tributary to Cosumnes River, Sacramento County)	River & Stream	24.00	Miles
5 - Central Valley Region	Morrison Creek	River & Stream	26.00	Miles
5 - Central Valley Region	Snake River (Butte and Sutter Counties)	River & Stream	26.00	Miles
5 - Central Valley Region	American River, Lower (Nimbus Dam to confluence with Sacramento River)	River & Stream	26.93	Miles
5 - Central Valley Region	Duck Slough (Merced County)	River & Stream	27.00	Miles
5 - Central Valley Region	Kaweah River, Lower (includes St Johns River)	River & Stream	27.00	Miles
5 - Central Valley Region	Mill Creek (Tulare County)	River & Stream	27.00	Miles

Region	Water Body Name	Water Body Type	Size	Unit
5 - Central Valley Region	San Joaquin River (Merced River to Tuolumne River)	River & Stream	29.00	Miles
5 - Central Valley Region	Main Drain (Kern County)	River & Stream	30.00	Miles
5 - Central Valley Region	Mill Creek (Fresno County)	River & Stream	30.00	Miles
5 - Central Valley Region	Los Banos Creek (below Los Banos Reservoir, Merced Co)	River & Stream	31.00	Miles
5 - Central Valley Region	Cross Creek (Kings & Tulare Co)	River & Stream	32.00	Miles
5 - Central Valley Region	Duck Creek (San Joaquin Co)	River & Stream	33.00	Miles
5 - Central Valley Region	Feather River, South Fork (from Little Grass Valley Reservoir to Lake Oroville, Butte and Plumas Counties)	River & Stream	33.03	Miles
5 - Central Valley Region	Dry Creek (trib.to Tuolumne R. at Modesto, E Stanislaus Co)	River & Stream	34.00	Miles
5 - Central Valley Region	Mokelumne River, Lower (in Delta Waterways, eastern portion)	River & Stream	34.00	Miles
5 - Central Valley Region	Cosumnes River, Lower (below Michigan Bar; partly in Delta Waterways, eastern portion)	River & Stream	36.00	Miles
5 - Central Valley Region	Feather River, West Branch (from Griffin Gulch to Lake Oroville)	River & Stream	37.00	Miles
5 - Central Valley Region	Stony Creek	River & Stream	41.85	Miles
5 - Central Valley Region	Feather River, Lower (Lake Oroville Dam to Confluence with Sacramento River)	River & Stream	42.00	Miles
5 - Central Valley Region	Colusa Basin Drain	River & Stream	49.29	Miles
5 - Central Valley Region	Merced River, Lower (McSwain Reservoir to San Joaquin River)	River & Stream	49.59	Miles

Region	Water Body Name	Water Body Type	Size	Unit
5 - Central Valley Region	Feather River, North Fork (below Lake Almanor)	River & Stream	54.15	Miles
5 - Central Valley Region	Deer Creek (Tulare County)	River & Stream	58.20	Miles
5 - Central Valley Region	Stanislaus River, Lower	River & Stream	59.02	Miles
5 - Central Valley Region	Tuolumne River, Lower (Don Pedro Reservoir to San Joaquin River)	River & Stream	60.00	Miles
5 - Central Valley Region	Littlejohns Creek	River & Stream	68.00	Miles
5 - Central Valley Region	Tule River, Lower	River & Stream	75.51	Miles
5 - Central Valley Region	Kings River, Lower (Pine Flat Reservoir to Island Weir)	River & Stream	76.00	Miles
5 - Central Valley Region	Feather River, Middle Fork (Sierra Valley to Lake Oroville, Butte and Plumas Counties)	River & Stream	77.11	Miles
5 - Central Valley Region	Sacramento River (Red Bluff to Knights Landing)	River & Stream	81.77	Miles
5 - Central Valley Region	Bear Creek (from Bear Valley to San Joaquin River, Mariposa and Merced Counties)	River & Stream	84.00	Miles
5 - Central Valley Region	San Joaquin River (Mendota Pool to Bear Creek)	River & Stream	88.00	Miles
5 - Central Valley Region	Cache Creek, Lower (Clear Lake Dam to Cache Creek Settling Basin near Yolo Bypass)	River & Stream	95.94	Miles
6 - Lahontan Region	Susan River (Litchfield to Honey Lake)	River & Stream	9.26	Miles
6 - Lahontan Region	Susan River (Susanville to Litchfield)	River & Stream	17.56	Miles
6 - Lahontan Region	Susan River (Headwaters to Susanville)	River & Stream	38.16	Miles

Region	Water Body Name	Water Body Type	Size	Unit
7 - Colorado River Basin Region	Colorado River and Associated Lakes and Reservoirs (California-Nevada border to Lake Havasu)	River & Stream	23.44	Miles
7 - Colorado River Basin Region	Coachella Valley Storm Water Channel	River & Stream	24.75	Miles
7 - Colorado River Basin Region	Alamo River	River & Stream	58.94	Miles
7 - Colorado River Basin Region	New River (Imperial County)	River & Stream	65.10	Miles
7 - Colorado River Basin Region	Colorado River and Associated Lakes and Reservoirs (Lake Havasu Dam to Imperial Dam)	River & Stream	147.23	Miles
7 - Colorado River Basin Region	Salton Sea	Saline Lake	233044.81	Acres
8 - Santa Ana Region	Rhine Channel	Bay & Harbor	20.00	Acres
8 - Santa Ana Region	Huntington Harbour	Bay & Harbor	220.90	Acres
8 - Santa Ana Region	Anaheim Bay	Bay & Harbor	402.02	Acres
8 - Santa Ana Region	Newport Bay, Lower (entire lower bay, including Rhine Channel, Turning Basin and South Lido Channel to east end of H-J Moorings)	Bay & Harbor	767.00	Acres
8 - Santa Ana Region	Bolsa Bay Marsh	Estuary	44.15	Acres
8 - Santa Ana Region	Bolsa Chica Ecological Reserve	Estuary	238.96	Acres
8 - Santa Ana Region	Newport Bay, Upper (Ecological Reserve)	Estuary	652.91	Acres
8 - Santa Ana Region	Elsinore, Lake	Lake & Reservoir	2430.59	Acres
8 - Santa Ana Region	Peters Canyon Channel	River & Stream	3.00	Miles
8 - Santa Ana Region	Talbert Channel (Orange Coy)	River & Stream	5.50	Miles

Region	Water Body Name	Water Body Type	Size	Unit
8 - Santa Ana Region	San Diego Creek Reach 2	River & Stream	6.27	Miles
8 - Santa Ana Region	Serrano Creek	River & Stream	7.20	Miles
8 - Santa Ana Region	San Diego Creek Reach 1	River & Stream	7.83	Miles
8 - Santa Ana Region	Santiago Creek, Reach 4	River & Stream	9.80	Miles
8 - Santa Ana Region	Silverado Creek	River & Stream	11.31	Miles
9 - San Diego Region	San Diego Bay Shoreline, Downtown Anchorage	Bay & Harbor	7.37	Acres
9 - San Diego Region	San Diego Bay Shoreline, Seventh Street Channel	Bay & Harbor	9.01	Acres
9 - San Diego Region	San Diego Bay Shoreline, North of 24th Street Marine Terminal	Bay & Harbor	9.49	Acres
9 - San Diego Region	San Diego Bay Shoreline, Vicinity of B St and Broadway Piers	Bay & Harbor	9.91	Acres
9 - San Diego Region	San Diego Bay Shoreline, near Chollas Creek	Bay & Harbor	14.76	Acres
9 - San Diego Region	San Diego Bay Shoreline, near sub base	Bay & Harbor	16.30	Acres
9 - San Diego Region	San Diego Bay Shoreline, near Coronado Bridge	Bay & Harbor	37.13	Acres
9 - San Diego Region	Oceanside Harbor	Bay & Harbor	52.21	Acres
9 - San Diego Region	San Diego Bay Shoreline, 32nd St San Diego Naval Station	Bay & Harbor	103.15	Acres
9 - San Diego Region	Dana Point Harbor	Bay & Harbor	119.47	Acres
9 - San Diego Region	Aliso Creek (mouth)	Estuary	0.29	Acres
9 - San Diego Region	Agua Hedionda Lagoon	Estuary	6.83	Acres
9 - San Diego Region	Buena Vista Lagoon	Estuary	202.30	Acres
9 - San Diego Region	Batiquitos Lagoon	Estuary	433.26	Acres
9 - San Diego Region	Los Penasquitos Lagoon	Estuary	468.92	Acres
9 - San Diego Region	San Elijo Lagoon	Estuary	565.80	Acres
9 - San Diego Region	Tijuana River Estuary	Estuary	1319.46	Acres

Region	Water Body Name	Water Body Type	Size	Unit
9 - San Diego Region	Segunda Deshecha Creek	River & Stream	0.92	Miles
9 - San Diego Region	San Juan Creek	River & Stream	1.02	Miles
9 - San Diego Region	Laguna Canyon Channel	River & Stream	1.60	Miles
9 - San Diego Region	Soledad Canyon	River & Stream	1.75	Miles
9 - San Diego Region	Cottonwood Creek (San Marcos Creek watershed)	River & Stream	1.90	Miles
9 - San Diego Region	Moro Canyon Creek	River & Stream	3.40	Miles
9 - San Diego Region	English Canyon	River & Stream	3.60	Miles
9 - San Diego Region	Oso Creek (lower)	River & Stream	4.00	Miles
9 - San Diego Region	Encinitas Creek	River & Stream	4.59	Miles
9 - San Diego Region	Sweetwater River, Lower (below Sweetwater Reservoir)	River & Stream	5.30	Miles
9 - San Diego Region	Tijuana River	River & Stream	6.00	Miles
9 - San Diego Region	Tecolote Creek	River & Stream	6.60	Miles
9 - San Diego Region	Agua Hedionda Creek	River & Stream	6.95	Miles
9 - San Diego Region	Poway Creek	River & Stream	7.30	Miles
9 - San Diego Region	Loma Alta Creek	River & Stream	7.76	Miles
9 - San Diego Region	Poggi Canyon Creek	River & Stream	7.80	Miles
9 - San Diego Region	Jamul Creek	River & Stream	10.00	Miles
9 - San Diego Region	Salt Creek (Orange County)	River & Stream	10.48	Miles
9 - San Diego Region	Buena Vista Creek	River & Stream	11.23	Miles
9 - San Diego Region	Los Penasquitos Creek	River & Stream	11.55	Miles
9 - San Diego Region	Murrieta Creek	River & Stream	11.86	Miles
9 - San Diego Region	Carroll Canyon	River & Stream	12.00	Miles
9 - San Diego Region	Santa Ysabel Creek (above Sutherland Reservoir)	River & Stream	12.00	Miles
9 - San Diego Region	Rose Creek	River & Stream	13.27	Miles
9 - San Diego Region	Bell Canyon Creek	River & Stream	14.00	Miles
9 - San Diego Region	San Diego River (Lower)	River & Stream	16.00	Miles

Region	Water Body Name	Water Body Type	Size	Unit
9 - San Diego Region	San Vicente Creek (San Diego County)	River & Stream	16.00	Miles
9 - San Diego Region	Santa Margarita River (Upper)	River & Stream	18.14	Miles
9 - San Diego Region	Aliso Creek	River & Stream	18.77	Miles
9 - San Diego Region	San Marcos Creek	River & Stream	18.99	Miles
9 - San Diego Region	San Dieguito River	River & Stream	19.00	Miles
9 - San Diego Region	Santa Margarita River (Lower)	River & Stream	19.21	Miles
9 - San Diego Region	San Luis Rey River, Lower (west of Interstate 15)	River & Stream	19.35	Miles
9 - San Diego Region	Arroyo Trabuco Creek	River & Stream	22.87	Miles
9 - San Diego Region	Escondido Creek	River & Stream	26.02	Miles
9 - San Diego Region	Temecula Creek	River & Stream	44.11	Miles

Appendix G. Flow Chart

Figure G - 1. Toxicity Reduction Evaluation Process Flowchart for Non-Storm Water NPDES Dischargers with Effluent Limitations

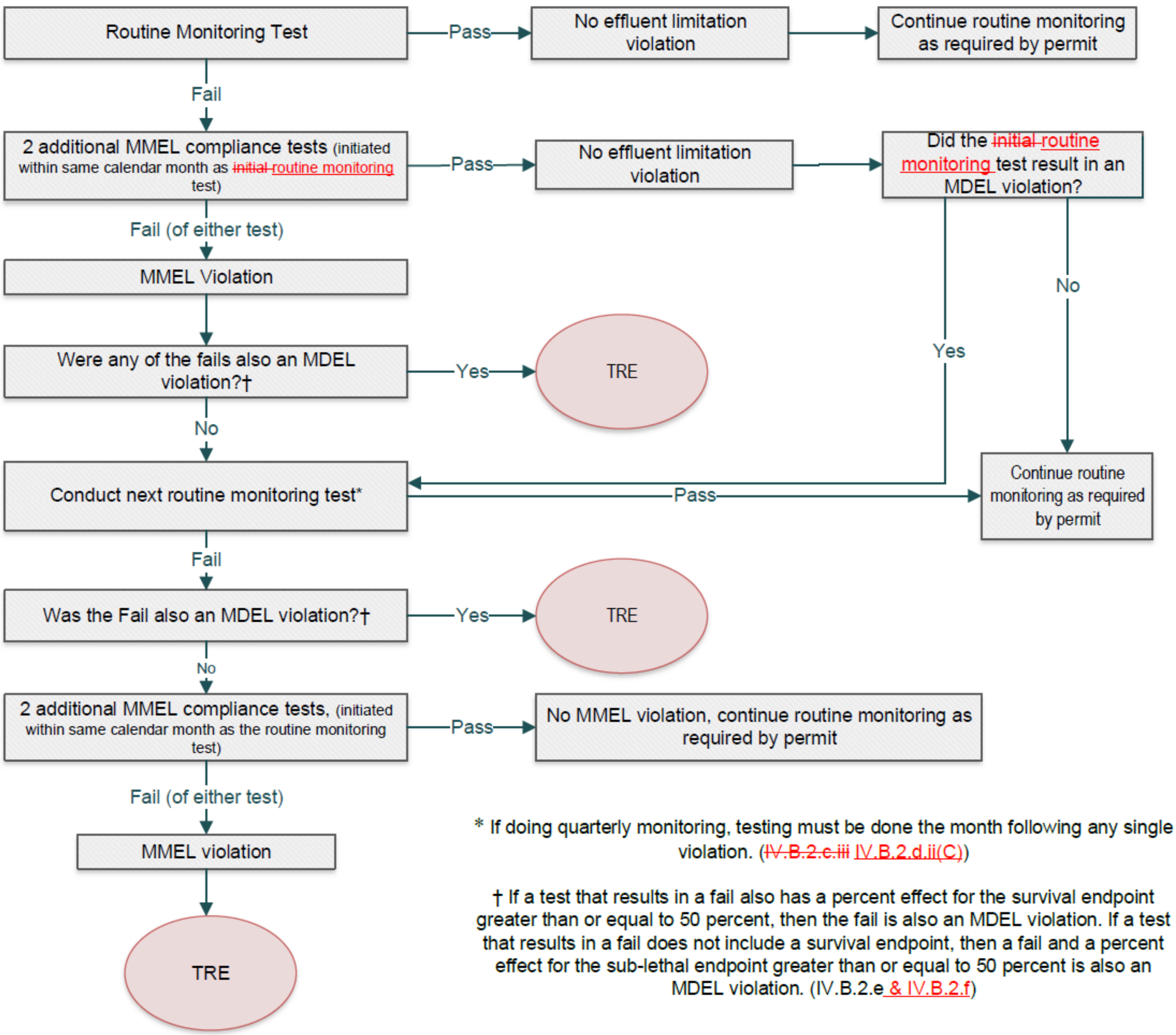
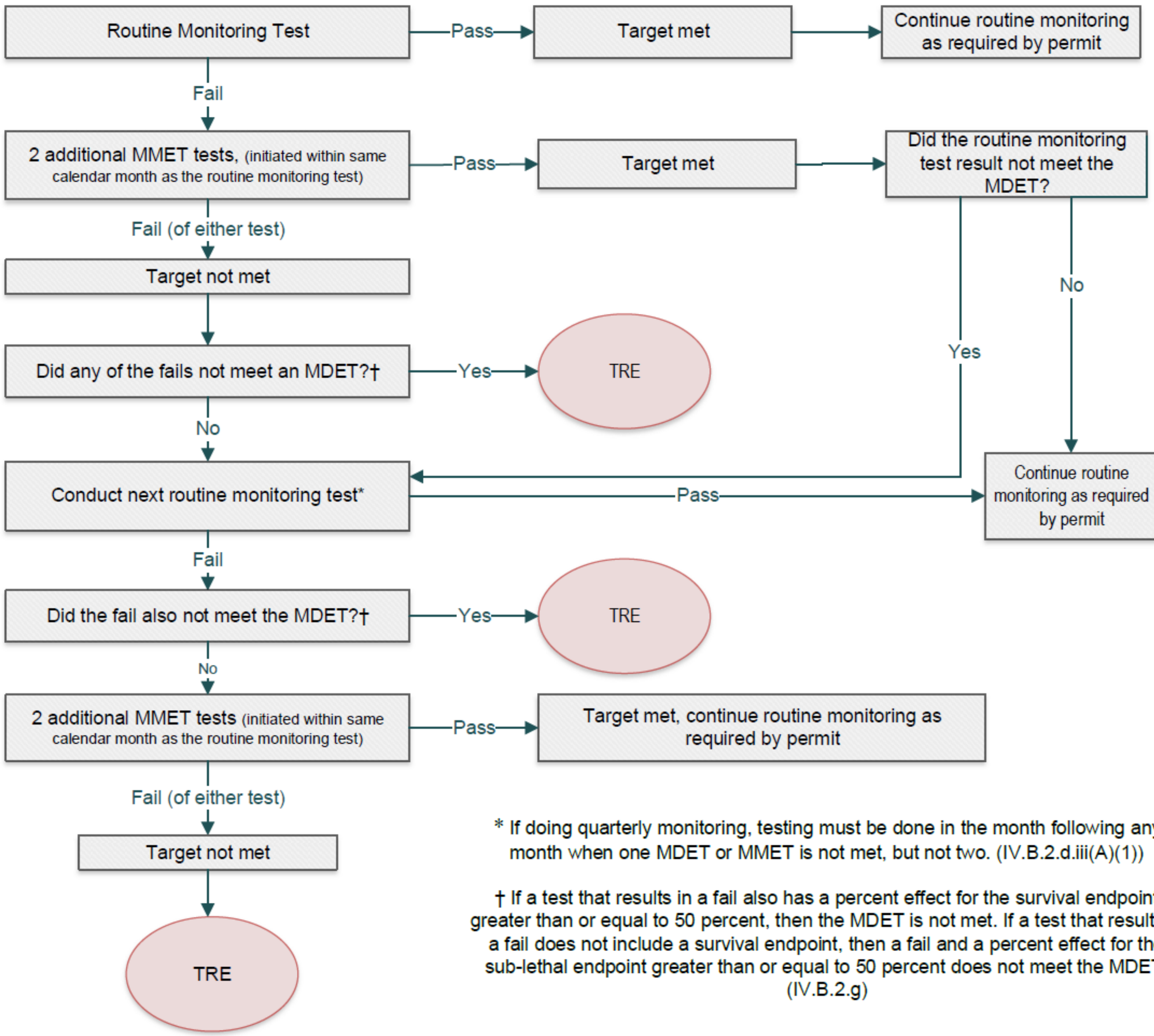


Figure G-2. Toxicity Reduction Evaluation Process Flowchart for Non-Storm Water NPDES Dischargers without Effluent Limitations



* If doing quarterly monitoring, testing must be done in the month following any month when one MDET or MMET is not met, but not two. (IV.B.2.d.iii(A)(1))

† If a test that results in a fail also has a percent effect for the survival endpoint greater than or equal to 50 percent, then the MDET is not met. If a test that results in a fail does not include a survival endpoint, then a fail and a percent effect for the sub-lethal endpoint greater than or equal to 50 percent does not meet the MDET. (IV.B.2.g)

Appendix H. Examples of Completed and Active TREs

The following table is a review of representative TREs throughout the state and country gathered from 1999-2017. The list provides examples of causes and solutions to address toxicity issues. Some of the examples are ongoing. In some instances, dischargers have begun a TIE process.

Table H-1. Completed and Active TREs in California

State	Fresh or Salt Water Discharge	Region	Toxicant(s) Identified	TRE Implementation
CA [1]	Fresh Water	San Francisco Regional Water Quality Control Board	Diazinon, Chlorpyrifos	• Multi-faceted public awareness program • Program to identify and control sources • Efforts to identify POTW processes and operations that effectively remove organophosphate insecticides
CA [4]	Fresh Water	Central Valley Regional Water Quality Control Board	Unknown	• Attempts to identify toxicants
CA [1]	Fresh Water	Santa Ana Regional Water Quality Control Board	Organics	• Diverted Central Ave flow to a nearby POTW so as to increase the mixed liquor suspended solids, sludge retention time, and hydraulic residence time

State	Fresh or Salt Water Discharge	Region	Toxicant(s) Identified	TRE Implementation
CA [5]	Fresh Water	Los Angeles Regional Water Quality Control Board	Unknown	• Conducting additional toxicity testing
CA [6]	Fresh Water	Central Coast Regional Water Quality Control Board	Unknown	• Conducting a TIE
CA [3]	Fresh Water	Central Valley Regional Water Quality Control Board	Unknown	• Attempts to identify toxicants
CA [7]	Fresh Water	Central Coast Regional Water Quality Control Board	Ammonia	• Treatment plant upgrade: nitrification-denitrification system
CA [3]	Fresh Water	Central Valley Regional Water Quality Control Board	Unknown	• Discharge will be removed through regionalization

State	Fresh or Salt Water Discharge	Region	Toxicant(s) Identified	TRE Implementation
CA [1]	Salt Water	San Francisco Regional Water Quality Control Board	Copper	• Pretreatment requirements
CA [8]	Salt Water	San Diego Regional Water Quality Control Board	Unknown	• The permit's effluent limitation for toxicity may not accurately account for dilution. Samples that account for dilution are non-toxic.
CA [9]	Salt Water	San Diego Regional Water Quality Control Board	Unknown	• A drain inlet was connected to the storm diversion system to the sanitary sewer.

[1] Toxicity Reduction and Toxicity Identification Evaluations for Effluents, Ambient Waters, and Other Aqueous Media, July 2005

[2] Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, August 1999

[3] Malaga County Water District TRE report, June 2012

[4] N. Morgan personal communication, March 2013

[5] D. Jablonski, personal communication, March 2013

[6] T. Smith, personal communication, March 2013

[7] K. DiSimone, personal communication, March 2013

[8] B. Neill, personal communication, July 2017

[9] R. Vicente, personal communication, August 2017

Table H-2. Completed and Active TREs in Other States

State	Fresh or Salt Water Discharge	Region	Toxicant(s) Identified	TRE Implementation
IN [2]	Fresh Water	N/A	Metals	• Consent decree issued to cadmium plating operation in violation of pretreatment requirements
KY [1]	Fresh Water	N/A	D-Limonene Petroleum Hydrocarbons Metals	• Treatment plant upgrade: increasing the size of oil and water separators • Management practice: elimination of purging activities at ill-equipped locations
NC [2]	Fresh Water	N/A	Unknown	• Treatment plant upgrade: biological nutrient removal and filtration treatment
NC [1]	Fresh Water	N/A	Surfactants	• Pretreatment requirements: selection of less toxic production materials and on-site evaluation of waste minimization practices • Relocation of outfall to increase dilution
TX [2]	Fresh Water	N/A	Ammonia	• Treatment plant upgrade (unspecified)
TX [1]	Fresh Water	N/A	Nitrate Ion	• Careful monitoring of nitrification process
UT [1]	Fresh Water	N/A	Calcium	• N/A (salt accumulation in older evaporation ponds)

State	Fresh or Salt Water Discharge	Region	Toxicant(s) Identified	TRE Implementation
NJ [2]	Salt Water	N/A	Ammonia Non-polar Organic Compounds Surfactants	• Pretreatment limits for ammonia • Pretreatment limits for toxicity

[1] Toxicity Reduction and Toxicity Identification Evaluations for Effluents, Ambient Waters, and Other Aqueous Media, July 2005

[2] Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, August 1999

Appendix I. Permits Used to Evaluate Current Conditions

Table I-1. Permits Used to Evaluate Current Conditions

Permit Number	Permittee	Facility Name
Region 1		
R1-2016-0001	City of Eureka	Elk River Wastewater Treatment Plant
R1-2016-0015	City of Healdsburg	City of Healdsburg Wastewater Treatment, Recycling and Disposal Facility
R1-2017-0004	Covelo Community Services District	Wastewater Treatment Plant
R1-2017-0005	City of Fortuna	Municipal Wastewater Treatment Plant
R1-2018-0002	Forestville Water District	Wastewater Treatment, Recycling and Disposal Facility
Region 2		
R2-2015-0021	Las Gallinas Valley Sanitary District	Las Gallinas Valley Sanitary District Sewage Treatment Plant and its wastewater collection system
R2-2016-0035	Napa Sanitation District	Soscol Water Recycling Facility and its collection system
R2-2016-0043	USS-POSCO Industries	Pittsburg Plant

Permit Number	Permittee	Facility Name
R2-2016-0047	Chevron Products Company, a division of Chevron USA Inc. Chevron Environmental Management Company. Chem Trade West US LLC	Chevron Richmond Refinery
R2-2017-0013	City of Pacifica	Calera Creek Water Recycling Plant and its wastewater collection system
R2-2017-0034	Rodeo Sanitary District	Rodeo Sanitary District Water Pollution Control Facility and its collection system
R2-2017-0039	Shell Oil Products US. Equilon Enterprises LLC	Shell Martinez Refinery
Region 3		
R3-2017-0026	South County Regional Wastewater Authority	South County Regional Wastewater Treatment and Reclamation Facility
R3-2017-0028	South County Regional Wastewater Authority	South County Regional Wastewater Treatment and Reclamation Facility
Region 4		
R4-2015-0070	Joint Outfall system (JOS, Permittee or Discharger)	San Jose Creek Water Reclamation Plant
R4-2016-0224	California Department of Water Resources	William E. Warne Power Plant

Permit Number	Permittee	Facility Name
R4-2017-0064	City of Burbank	Burbank Water Reclamation Plant (Burbank WRP) and its associated wastewater collection system and outfalls
R4-2017-0190	Lubricating Specialties Company	Pico Rivera Facility
Region 5		
R5-2013-0156	City of Davis	Wastewater Treatment Plant
R5-2014-0007	City of Lincoln	Wastewater Treatment Reclamation Facility
R5-2016-0012	Sacramento Regional County Sanitation District	Sacramento Regional Wastewater Treatment Plant
R5-2016-0020	Sacramento Regional County Sanitation District	Sacramento Regional Wastewater Treatment Plant
R5-2017-0014	Pactiv LLC	Pactiv Molded Pulp Mill
R5-2017-0037	River Highlands Community Services District, County of Yuba, and Gold Village Land Development, LLC	Hammonton Gold Village Wastewater Treatment Plant
R5-2017-0085	Owners and operators of municipal wastewater treatment facilities that meet water quality objectives/criteria at the point of discharge to waters of the United States.	Various
R5-2017-0113	City of Tracy	Wastewater Treatment Plant
R5-2017-0119	Mountain House Community Services District	Wastewater Treatment Plant

Permit Number	Permittee	Facility Name
R5-2018-0003	Meridian Beartrack Co	Royal Mountain King Mine
Region 6		
R6V-2013-0038	Victor Valley Wastewater Reclamation Authority	Victor Valley Regional Wastewater Treatment Plant
R6V-2017-0025	California Department of Fish and Wildlife	Mojave River Fish Hatchery
Region 7		
R7-2017-0006	Coachella Valley Water District	Mid-Valley Water Reclamation Plant No.4
R7-2017-0016	Seeley County Water District	Seeley County Wastewater Treatment Plant
R7-2017-0017	City of Westmorland	City of Westmorland Wastewater Treatment Plant
Region 8	Blank Cell	Blank Cell
R8-2013-0032	The Colton/San Bernardino Regional Tertiary Treatment and Water Reclamation Authority	Regional Tertiary Treatment Rapid Infiltration and Extraction Facility
R8-2015-0027	Yucaipa Valley Water District	Henry N. Wochholz Regional Water Recycling Facility
R8-2017-0049	City of San Bernardino Municipal Water Department	Water Reclamation Facility, City of San Bernardino
Region 9		
R9-2015-0026	City of Escondido	Hale Avenue Resource Recovery Facility

Permit Number	Permittee	Facility Name
R9-2016-0116	General Dynamics National Steel and Shipbuilding Company (NASSCO)	General Dynamics National Steel and Shipbuilding Company (NASSCO)
R9-2017-0020	Sweetwater Authority	Richard A. Reynolds Desalination Facility

Appendix J. Evaluating Laboratory Performance with the Chronic *Ceriodaphnia dubia* Reproduction Toxicity Test

J.1 Overview and Key Findings

This appendix compiles and discusses recent research and information on how laboratory performance affects the pass or fail result of the chronic *Ceriodaphnia dubia* reproduction toxicity test when using the Test of Significant Toxicity (TST) and No Observed Effect Concentration (NOEC) statistical approaches. The goal of this appendix is to provide additional clarity and analysis of these statistical approaches and how laboratory performance, in terms of within-laboratory variability (precision), is key in ensuring the statistical power of the TST.

This appendix includes (1) key findings, (2) a summary of key statistical concepts, (3) an analysis of laboratory performance and its effect on the false positive probabilities when using the NOEC and the TST, (4) an assessment of the occurrences of fails at or below the 10 percent effect of permit compliance data, (5) and an analysis of probabilities of having an effluent limitation violation and being required to conduct a toxicity reduction evaluation (TRE) based on the probability of a fail at or below 10 percent effect.

This appendix focuses on chronic *C. dubia* reproduction toxicity tests for non-stormwater National Pollution Discharge Elimination System (NPDES) discharges. Therefore, samples of concern are effluent collected at the instream waste concentration (IWC). For additional discussion on statistical analysis, see Section 5.3 of this Staff Report.

Key Findings:

- When within-test variability is low and the percent effect is low, the NOEC is more likely to declare a sample toxic than the TST. When within-test variability is high and the percent effect is greater than or equal to 25 percent, the NOEC is less likely to declare a sample toxic, while the TST will always declare the sample toxic.
- Fox et al. 2019 examined data from 2012 to 2015 from a subset of California laboratories. Four of six laboratories had low within-test variability and, therefore, can attain the acceptable false positive probability of five percent using 10 test replicates (N=10). If the number of replicates were increased to 20 (N=20), then five of the six laboratories would meet the acceptable false positive probability.
- State Water Board staff examined more recent data from 2017 to 2019 from a subset of California laboratories. Three of four laboratories had low within-test variability and can attain the acceptable probability of a fail at or below 10 percent effect of five

percent using 10 replicates. If the number of replicates were increased to 20, then all 4 laboratories would meet the acceptable probability.

- The TST statistical approach incentivizes laboratories to produce more precise data and increase statistical power. The Los Angeles County Sanitation District's San Jose Creek Water Quality Laboratory's (LACSD Municipal Laboratory) test performance improved when they began using the TST statistical approach. This was noted by Fox et al. 2019, as well as independent analyses by the State Water Board staff. State Water Board staff also analyzed the test performance of a commercial laboratory that uses the TST statistical approach and concluded that their precision consistently improved from 2017 to 2019.
- The TST statistical approach is less likely than the NOEC statistical approach to identify a sample as toxic when biological effects are negligible (at or below a 10 percent effect) and will always identify a sample as toxic when percent effect is at or above a 25 percent effect level. Of the 984 California laboratory test results reviewed, there were no results of a fail when the percent effect was 10 percent or less, and no results of a pass when the percent effect was 25 percent or greater.
- The draft Toxicity Provisions state that more than one TST test fail in a calendar month is a median monthly effluent limitation (MMEL) violation, and two violations in a month or in two consecutive months will result in a requirement to conduct a TRE. The probability is very low of determining a single MMEL violation based on TST fails with a percent effect at or below 10. The probability of being required to conduct a TRE based on TST fails with a percent effect at or below 10 is even lower.

J.2 Relevant Statistical Concepts

This section describes relevant statistical concepts to inform subsequent sections.

The *true mean* is the mean for a theoretical statistical population of results from indefinite repetition of toxicity tests on the same control water and effluent sample. In contrast, the mean for the biological measure for a single toxicity test is referred to as the *sample mean*. (U.S. EPA 2010).

The *percent effect* (PE), or the mean percent effect, for a chronic *C. dubia* reproduction toxicity test is the difference between the control mean and the IWC treatment (sample) mean divided by the control mean. Restated, it is the difference between the mean number of neonates in the control replicates and the mean number of neonates in the IWC sample replicates, divided by the control mean. The percent effect does not reflect the amount of variability among replicates in a treatment. The TST statistical formula incorporates the measure of variability in determination of the test result. Figure J-1 illustrates how within-test variability is a determining factor in the TST result in relation to percent effect (Dr. Jerry Diamond, Personal Communication 2019).

Within-test (intra-test) variability is the variability in test organism response within a concentration averaged across all concentrations of the test material in a single test (U.S. EPA 2000).

Within-laboratory (intra-laboratory) variability is the variability that is measured when tests are conducted using specific methods under reasonably constant conditions in the same laboratory. Within-laboratory variability, as used in this document, includes within-test variability.

The *coefficient of variation* (CV) measures the relative variation of a data set. It is defined as the standard deviation divided by the mean and is sometimes known as the relative standard deviation. A lower CV value indicates lower within-test variability in the number of neonates produced in each individual replicate, compared to the mean. For the TST, the CV can be determined for both the control and sample (IWC) treatments. Often, the control CV data from a number of tests is used to assess within-laboratory variability over time.

The following terms are often used interchangeably:

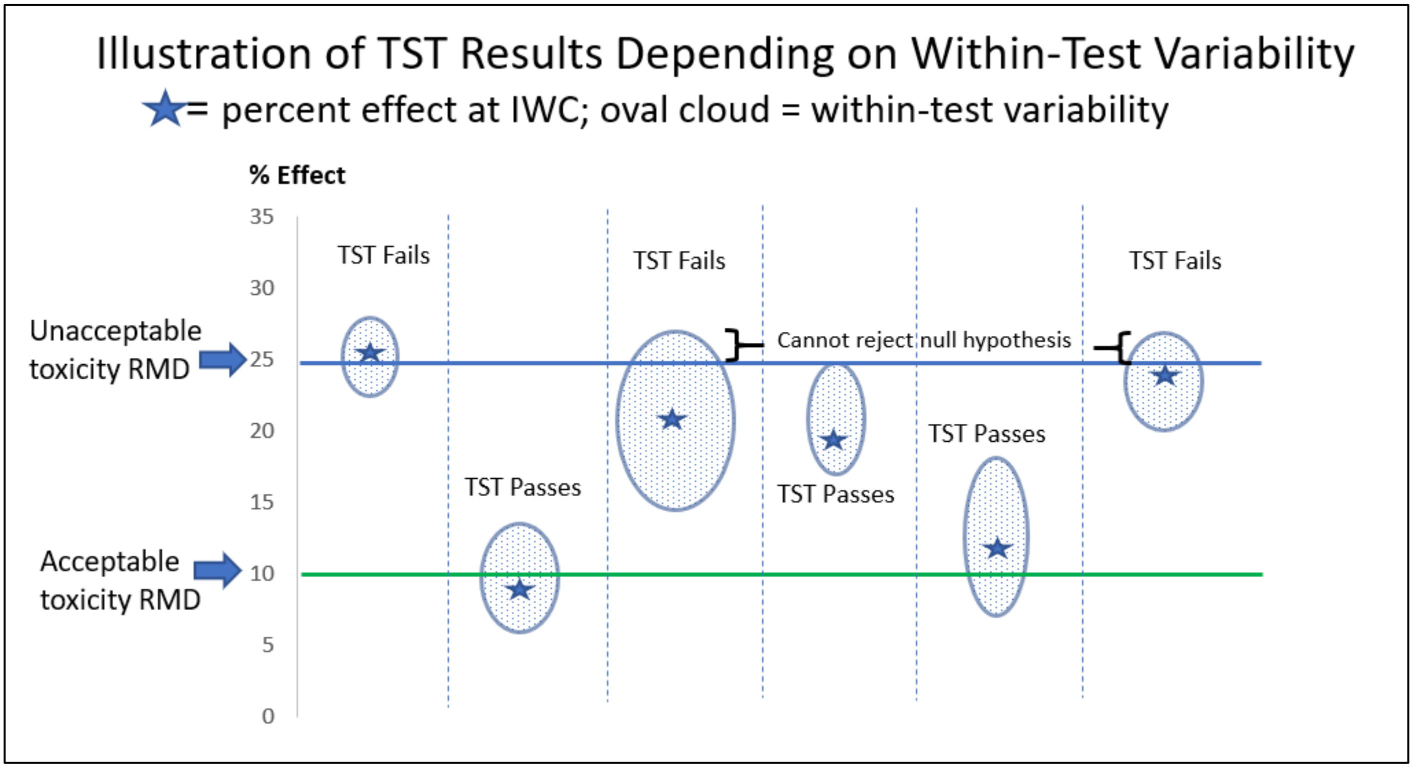
lower control coefficient of variation (CV) = lower within-test variability = higher precision

higher control coefficient of variation (CV) = higher within-test variability = lower test precision

A *false positive* is when the IWC sample is declared toxic (fail) but the sample is in fact not toxic. In the TST statistical approach, the false positive probability is the probability of a fail occurring when the percent effect is at 10 percent or less. No one effluent test can be called a "false positive" because of the variability of the data around the mean in the treatment and the control. The only true false positive is one where the sample is known to be truly non-toxic and the test results in a fail.

A *false negative* is when the IWC sample is declared not toxic (pass) but the sample is in fact toxic. In the TST statistical approach, the false negative probability is denoted as alpha (α), and applies when the percent effect at the IWC is greater than or equal to 25 percent for a given test.

Figure J-1. Illustration of TST Results Depending on Within-Test Variability



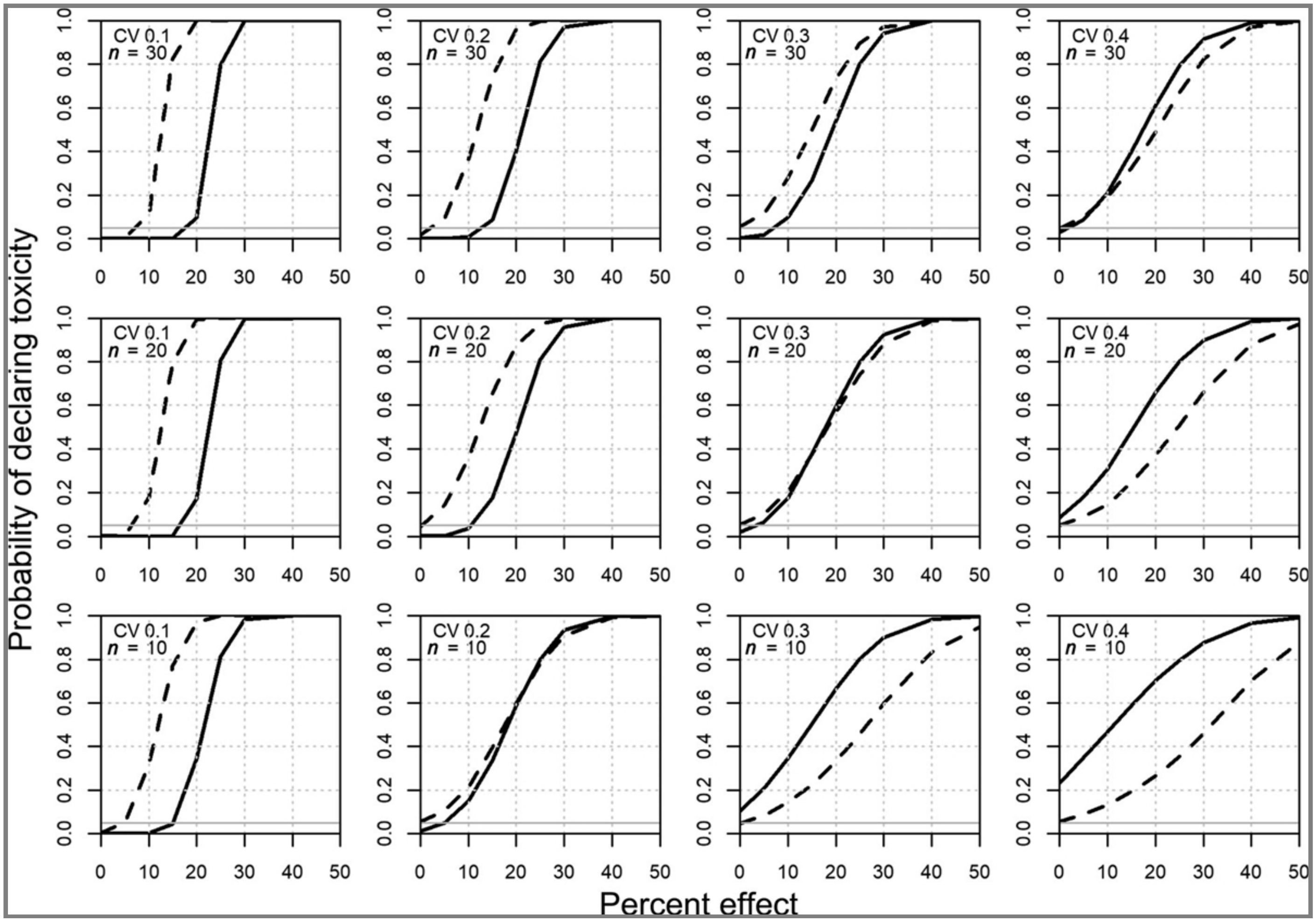
J.3. False Positive and Negative Probabilities and Laboratory Performance

In March 2019, the Environmental Toxicity and Chemistry journal published a peer-reviewed article titled *Comparison of False-Positive Rates of 2 Hypothesis-Test Approaches in Relation to Laboratory Toxicity Test Performance* by Dr. Fox, Dr. Denton, Dr. Diamond, and Ms. Stuber (Fox et al. 2019). The article compares the false positive and false negative rates of the NOEC and the TST to illustrate the effect of laboratory performance when using U.S. EPA's *C. dubia* reproduction toxicity test.

Probabilities of Declaring Toxicity Using the NOEC and TST Statistical Approaches

Figure J-2 presents the probability curves from Fox et al. 2019 paper. Precision is measured as the control CV. The columns from left to right show the probabilities of declaring a sample toxic with decreasing precision. The rows from bottom to top to show probabilities of declaring a sample toxic as the number of replicates increases.

Figure J-2. Probabilities of Declaring a Sample Toxic When Using the NOEC and TST (From Fox et al. 2019)



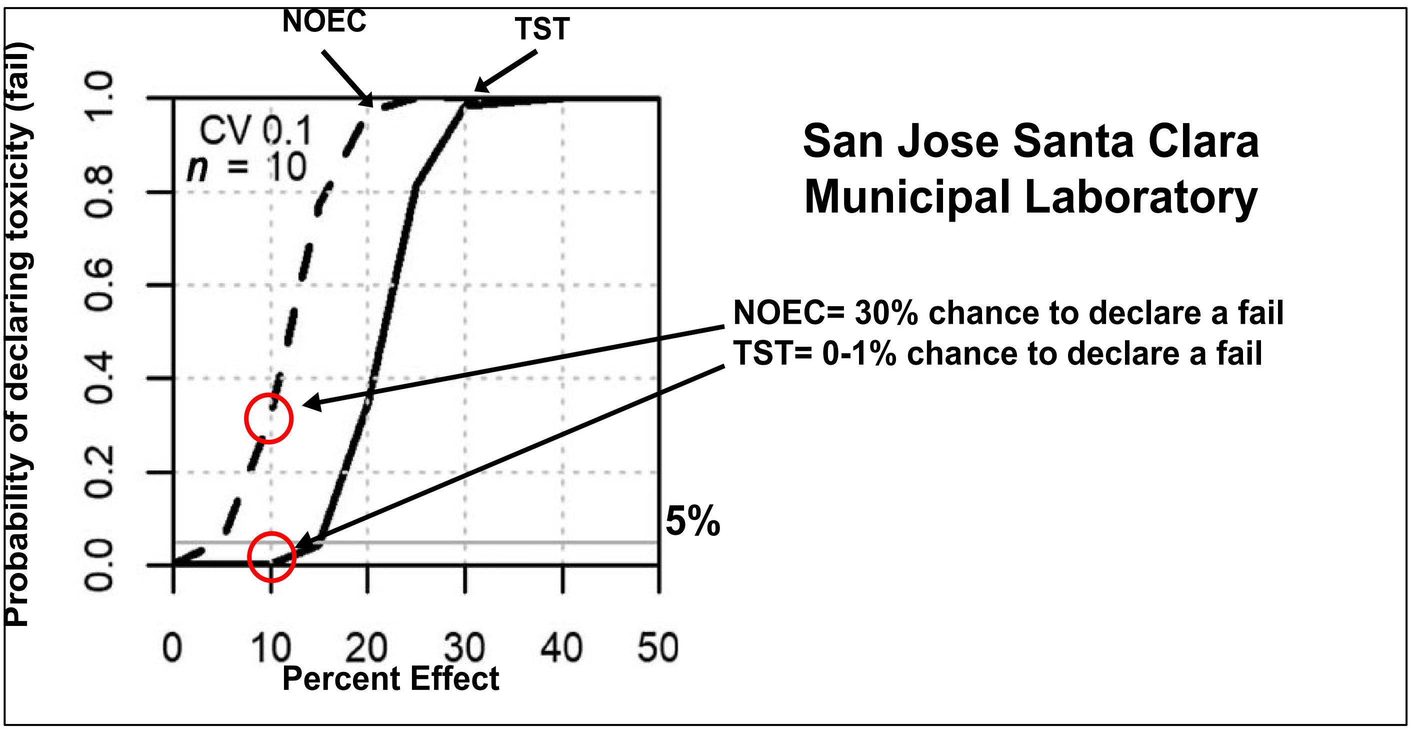
From Fox et al. 2019: Probability of declaring a sample toxic using the no-observed-effect-concentration (NOEC) and test of significant toxicity (TST) based on simulating 10,000 whole-effluent toxicity tests at each of various percent effect parameter values (horizontal axis), 4 values of control coefficient of variation parameter, and 3 values for number of test replicates. Gray horizontal line shows probability of 0.05. Solid curves represent TST and broken curves, NOEC. CV = coefficient of variation.

Comparison of NOEC and TST False Positive Error Rates

Fox et al. 2019 found that the TST statistical approach incentivizes laboratories to produce more precise data and increase statistical power. When within-test variability is low and the percent effect is low, the NOEC is more likely to declare a sample toxic than the TST. When within-test variability is high and the percent effect is high, the NOEC is less likely to declare a sample toxic than the TST.

When precision is high, the NOEC has a higher probability of declaring a fail when the percent effect is less than or equal to the 10 percent effect. A real-world example of high precision achieved in this range is the City of San Jose / Santa Clara Water Pollution Control Plant Laboratory (San Jose Santa Clara Municipal Laboratory), which, per Fox et al. 2019, had a median control CV of 0.11. Figure J-3 shows the probability curve for this CV and replicate number, which was taken from the larger suite of probability curves in Figure J-2. Using the NOEC statistical approach (the dashed line), there is approximately a 30 percent chance of declaring the sample toxic when there is a 10 percent effect. Using the TST statistical approach (the solid line), there is less than one percent chance of declaring the sample toxic when there is a 10 percent effect.

Figure J-3. San Jose Santa Clara Municipal Laboratory Probability Curves for NOEC and TST (From Fox et al. 2019)



The San Jose Santa Clara Municipal Laboratory has low within-laboratory variability with 10 replicates, and they can attain the acceptable probability of a fail at or below 10 percent effect (five percent). For laboratories who have a higher median control CV, the replicate number of 10 may be inadequate to meet the acceptable false positive probability. Laboratories that currently have a median control CV approaching 0.2 would need to reduce within-laboratory variability and/or increase their number of replicates[23]. The additional replicate number needed are not required to be in multiples of 10. The number can be calculated based on the

[23] Analysis using the TST is conducted comparing the laboratory control to the IWC treatment. Laboratories may choose to increase their number of replicates above 10 for the control and IWC, if desired.

laboratory's median control CV (Fox et al. 2019).

California Laboratory Performance

In this section California laboratory performance data is presented from two different analyses. The first is from eight different laboratories that were presented in the Fox et al. 2019 paper. The second is from four different laboratories[24] analyzed by State Water Board staff to assess the ability of laboratories to attain the acceptable probability of a fail at or below 10 percent effect.

Table J-1 summarizes the individual laboratory control CV information from Fox et al. 2019 for the eight California laboratories.

[24] There are three unknown California laboratories (laboratories 1, 2, 3) and the same LACSD Municipal Laboratory analyzed by Fox et al. 2019. Because the names are not known for the three laboratories, there is the possibility that some or all of the three laboratories used in the State Water Board analysis might be some of the same laboratories in Fox et al. 2019. The data sets do not overlap temporally, therefore the analysis of the data sets are at a minimum, unique for time period.

Table J-1. Chronic *C. dubia* Reproduction Control CV Values for Eight California Laboratories from Fox et al. 2019

Laboratory	Time Period	Number of Tests	Median Control CV	False Positive Probability met with 10 Replicates*	False Positive Probability met with 10 to 20 Replicates*
A-Commercial Lab	2012 to 2015	43	0.23	no	no
B-Commercial Lab	2012 to 2015	18	0.15	yes	yes
C-Commercial Lab	2012 to 2015	20	0.20	no	yes
D-2 LACSD Municipal Laboratory	2012 to 2015	57	0.10	yes	yes
E-Commercial Lab	2012 to 2015	22	0.11	yes	yes
F-San Jose Santa Clara Municipal Laboratory	2012 to 2015	20	0.11	yes	yes
D-1 LACSD Municipal Laboratory	Pre-2012 TST Test Drive	30	0.17	no	yes

Laboratory	Time Period	Number of Tests	Median Control CV	False Positive Probability met with 10 Replicates*	False Positive Probability met with 10 to 20 Replicates*
G-Commercial Lab	Pre-2012 TST Test Drive	17	0.09	yes	yes
H-Commercial Lab	Pre-2012 TST Test Drive	17	0.10	yes	yes

* Based on Fox Probability Memo 2019**.** Probabilities were produced by R function *TST.pwr.fn2*, posted originally at https://figshare.com/articles/WET_Error_Rates_for_TST_NOEC_Supporting_Information/7122812 as a supplement to Fox et al. 2019. The function is included in the supporting document "Rfunctions-MMEL.R."

Prior to 2012

For both laboratories G and H, within-test variability prior to the *Effluent Stormwater and Ambient Toxicity Test Drive Analysis of the Test of Significant Toxicity* (TST Test Drive; SWRCB 2011) was low (median control CV less than or equal to 0.10). The actual test result data provided by these laboratories are part of the TST Test Drive analysis discussed later in this appendix. For the LACSD Municipal Laboratory, a replicate number between 10-20 would be needed to meet the acceptable probability of a fail at or below 10 percent effect (five percent).

From 2012 to 2015

For the post TST Test Drive results, four of six California laboratories have low within-test variability and can attain the acceptable probability of a fail at or below 10 percent effect (five percent) with 10 replicates. If the number of replicates increases between 10 and 20, then five of the six laboratories would meet the acceptable probability of a fail at or below 10 percent effect with their current median control CVs.

From 2017 to 2019

According to data from the three commercial laboratories and the LACSD Municipal Laboratory from the 2017 through 2019 time period, three of the four laboratories have low within-test variability and can attain the acceptable probability of a fail at or below 10 percent effect with 10 replicates and their current median control CVs. For Commercial Laboratory #3, within-test variability has decreased each year (from a CV of 0.24 in 2017 to a CV of 0.16 in 2019), and 11 replicates would be needed to meet the acceptable probability of a fail at or below 10 percent effect.

Table J-2. Chronic *C. dubia* Reproduction Control CV Values for Four California Laboratories from Submitted Data & CIWQS

Laboratory	Time Period	Number of Tests	Median Control CV	False Positive Probability met with 10 Replicates	False Positive Probability met with 10 to 20 Replicates
Commercial Laboratory #1	2018 to 2019	75	0.08	yes	yes
Commercial Laboratory #2	2019	75	0.12	yes	yes
Commercial Laboratory #3	2019	100	0.16	no	yes

Laboratory	Time Period	Number of Tests	Median Control CV	False Positive Probability met with 10 Replicates	False Positive Probability met with 10 to 20 Replicates
LACSD Municipal Laboratory	2017 to 2018	203	0.13	yes	yes

Improvements in Laboratory Performance

State Water Board staff analyzed control CV data to compare within-laboratory variability before and after the TST statistical approach was required in LACSD's wastewater discharge permits. The Los Angeles Regional Water Board began to include the TST statistical approach into these NPDES permits in 2014. Table J-3 contains data for two laboratories who conduct the *C. dubia* test with the TST statistical analysis; the LACSD Municipal Laboratory and Commercial Laboratory #3. Figure J-4 presents the entire data set of the LACSD Municipal Laboratory's minimum, median, and maximum control CV's from 835 chronic *C. dubia* reproduction toxicity tests run between 2010 and 2018.

LACSD Municipal Laboratory

Both the Fox et al. 2019 researchers and State Water Board staff found LACSD Municipal Laboratory improved their laboratory performance after 2012, as demonstrated by reductions in the control CVs and within-test variability. At their most recent median control CV, LACSD Municipal Laboratory would need 10 replicates to attain the acceptable false positive probability. The district is currently running 20 replicates at the control and IWC. By running the additional replicates, the probability of declaring a sample toxic is less than one percent when the percent effect is 10 percent or less. This is well below the acceptable probability of a fail at or below 10 percent effect (five percent).

Commercial Laboratory #3

In Table J-3, Commercial Laboratory #3 in 2017 had the highest median control CV of the four laboratories. This laboratory is known to conduct a portion of their tests using the TST statistical approach for compliance. Looking at data from three years, there has been a consistent improvement of performance at Commercial Laboratory #3. For the 2019 median control CV data, this laboratory could meet the acceptable probability of a fail at or below 10 percent effect (five percent) with a replicate number of 11.

Table J-3. Chronic *C. dubia* Reproduction Control CV Values for LACSD Municipal Laboratory and Commercial Laboratory #3 Over Time

Laboratory	Time Period	Number of Tests	Median Control CV	Acceptable False positive Probability met at N=10	Acceptable False positive Probability met at N= 10 to 20
LACSD Municipal Laboratory	Pre-2012 TST Test Drive	30	0.17	no	yes
LACSD Municipal Laboratory	2012 to 2015	57	0.10	yes	yes
LACSD Municipal Laboratory	2017 to 2018	203	0.13	yes	yes
Commercial Laboratory #3	2017	93	0.24	no	yes
Commercial Laboratory #3	2018	142	0.19	no	yes
Commercial Laboratory #3	2019	100	0.16	no	yes

California vs. National Laboratory Performance

Fox et al. 2019 also found that within-test variability of assessed California laboratories is comparable to national laboratories that were assessed in U.S. EPA's TST Implementation Document (U.S. EPA 2010). Table J-4 compares the percentiles of *C. dubia* reproduction toxicity test control CV values between the national TST Technical Document and the eight California laboratories assessed in Fox et al. 2019. The "Percentile" column represents the percentage of tests (in the specified data set) which had a control CV less than the specified value. For example: of the 244 toxicity tests examined in Fox et al. 2019, 90% of the tests had a control CV less than 0.332.

The median CV value (i.e., the 50th percentile) for California laboratories assessed by Fox et al. 2019 is 0.147. This demonstrates that California laboratories' performance is consistent with other laboratories across the nation and are able to successfully conduct chronic *C. dubia* reproduction toxicity tests with low within-in test variability.

Figure J-4. Minimum, Median, and Maximum Control CV Values for the LACSD Municipal Laboratory from 2010 through 2018

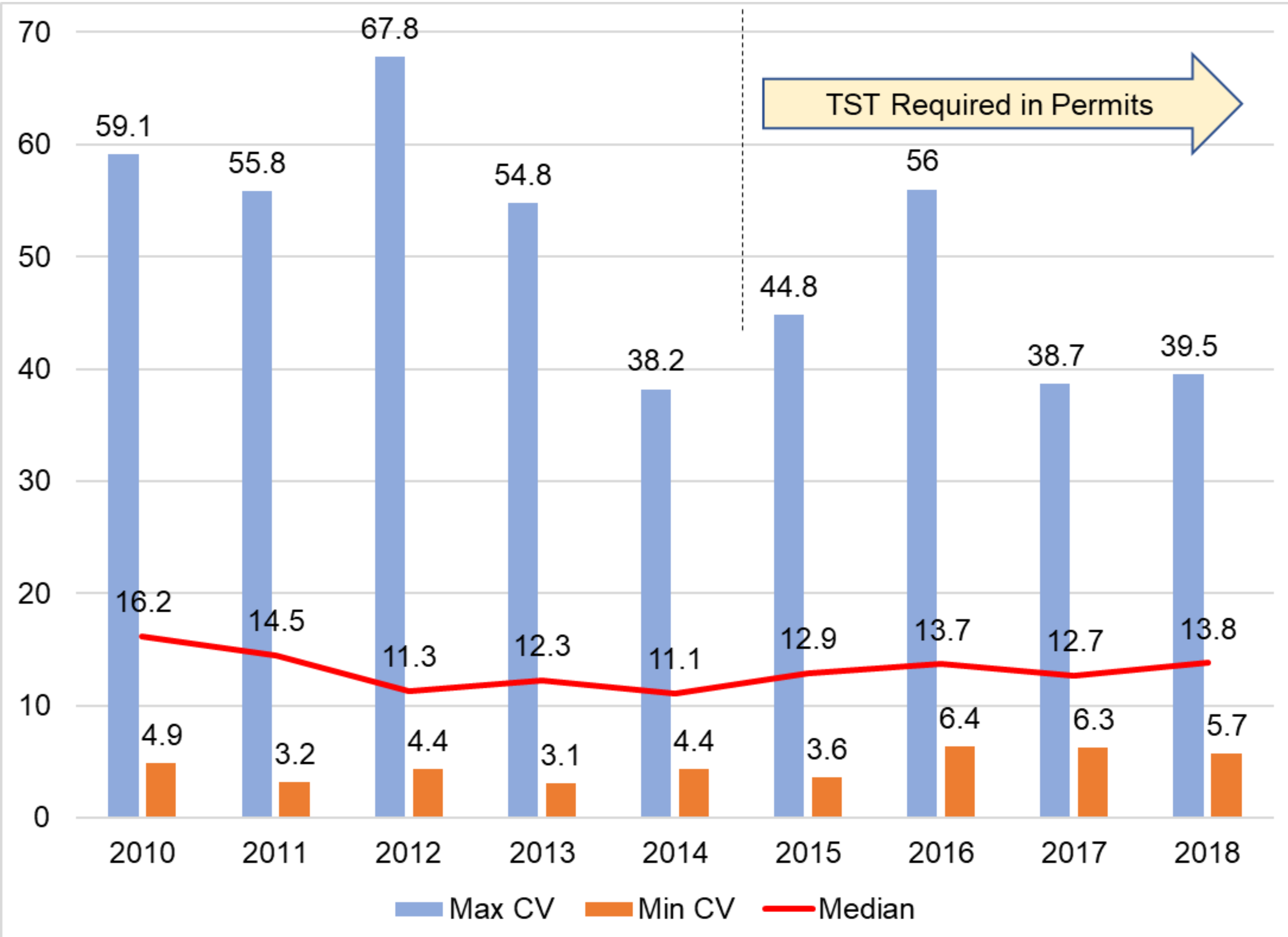


Table J-4. Comparison of Percentiles of *C. dubia* Control CVs between the National Study (U.S. EPA 2010) and Fox et al. 2019

Percentile	Control CV's from U.S. EPA 2010 TST Technical Document	Control CV's From Fox et al. 2019 Study
0%	—	0.036
10%	0.08	0.076
25%	0.1	0.097
50%	0.15	0.147
75%	0.24	0.244

Percentile	Control CV's from U.S. EPA 2010 TST Technical Document	Control CV's From Fox et al. 2019 Study
90%	0.35	0.332
100%	—	0.568
Number of Tests	792	244
Number of Laboratories	44	8

J.4. Permit Compliance Data

The appendix discussion to this point has focused on how laboratory performance affects meeting the acceptable false positive probability of a fail at or below 10 percent effect. State Water Board staff analyzed six data sets of actual test results using TST to evaluate how often a sample was declared toxic when the percent effect was 10 percent or less, and how often a sample was declared not toxic when the percent effect was 25 percent or greater. The test data were analyzed with the TST statistical approach, except for the TST Test Drive data, which has both the NOEC and TST results. The individual facilities were not identified in most of the data sets.

Under the NOEC, historic data has shown that high within-test variability results in a higher number of passes when the percent effect is greater than or equal to 25 percent than the TST (SWRCB 2011; Diamond et al. 2013). Conversely, the NOEC will result in a fail at a percent effect less than or equal to 10 percent more often when within-test variability is low (Diamond et al. 2013; Fox et al. 2019).

The following six data sets were analyzed as these data were readily available and had already been compiled for other purposes:

- TST Test Drive - NPDES facilities only
- The County of Los Angeles
- The City of Los Angeles
- City of Simi Valley
- City of San Jose Santa Clara Municipal Laboratory
- City and County of Honolulu

The staff evaluation found that the TST statistical approach is less likely to identify a sample as toxic when biological effects are negligible (at or below a 10 percent effect) and more likely to identify a sample as toxic when effects are biologically significant (at or above a 25 percent effect) than the NOEC statistical approach. Of the 984 test results reviewed from California laboratories, there were no results of a fail when the percent effect was 10 percent or less, and no results of a pass when the percent effect was 25 percent or greater.

Comparison of NOEC and TST Results Using TST Test Drive Data

Staff queried data compiled for the TST Test Drive for the six NPDES wastewater facilities and analyzed 209 chronic *C. dubia* reproduction toxicity test results using both the NOEC and TST statistical approaches. The TST Test Drive is described in Section 5.3.1 of this Staff Report.

Figure J-5 shows the toxicity data evaluated using the NOEC, and Figure J-6 shows the same data evaluated using the TST. Both figures highlight the number of times tests resulted in a fail (i.e., a determination of toxicity) or a pass (i.e., a determination of no toxicity) and the calculated percent effect.

When using the NOEC statistical approach, there were three results when there was a fail when the percent effect was 10 percent or less. There were five where there was a fail between 10 and 25 percent effect. There were five results when there was a pass when the percent effect was 25 percent or greater. When using the TST statistical approach, there were no results of a fail when the percent effect was 10 percent or less. There were 13 results of a fail in the 10-25 percent effect range, and no results of a pass when the percent effect was 25 percent or greater.

Figure J-5. TST Test Drive Results for NPDES Facilities Using the NOEC Analysis

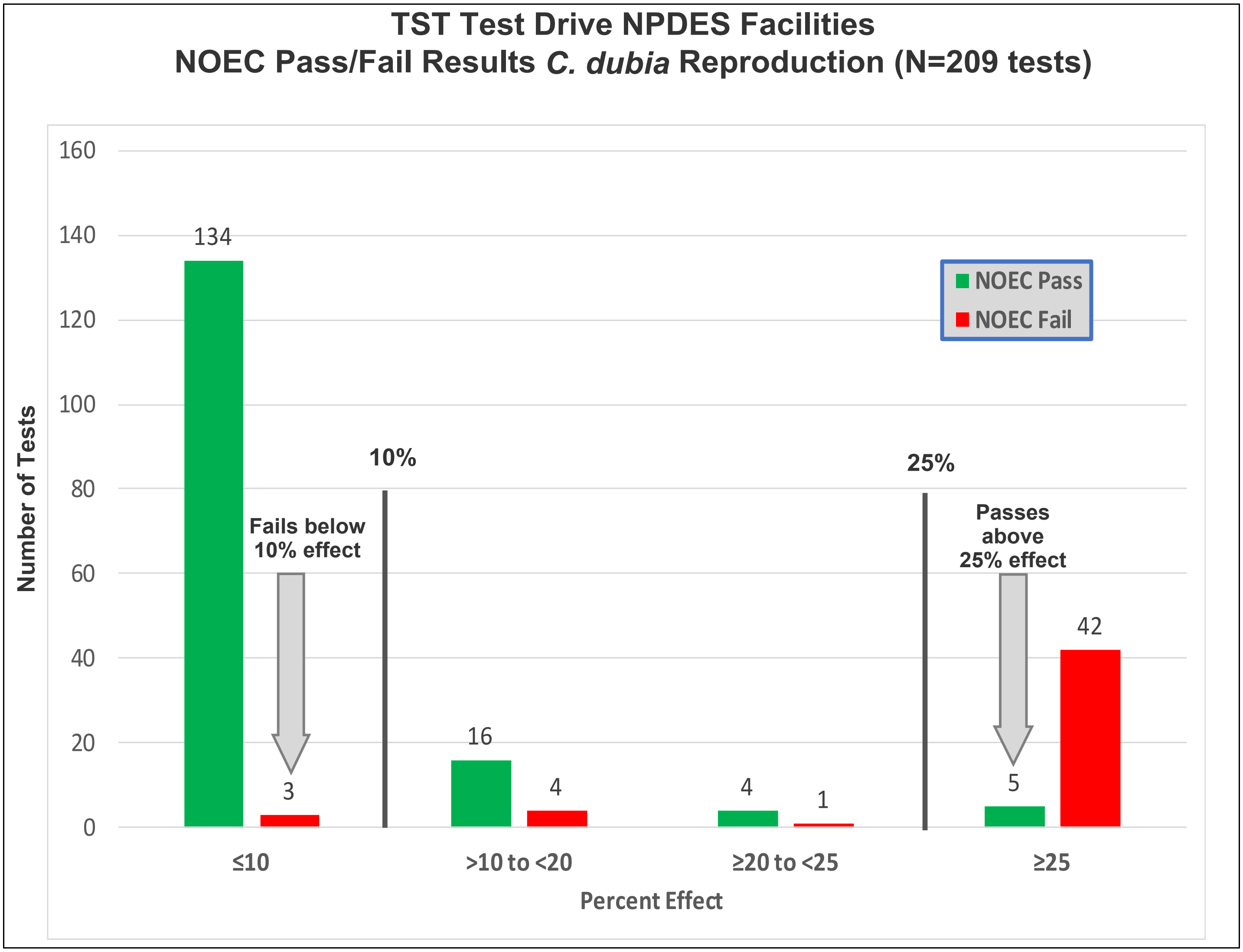
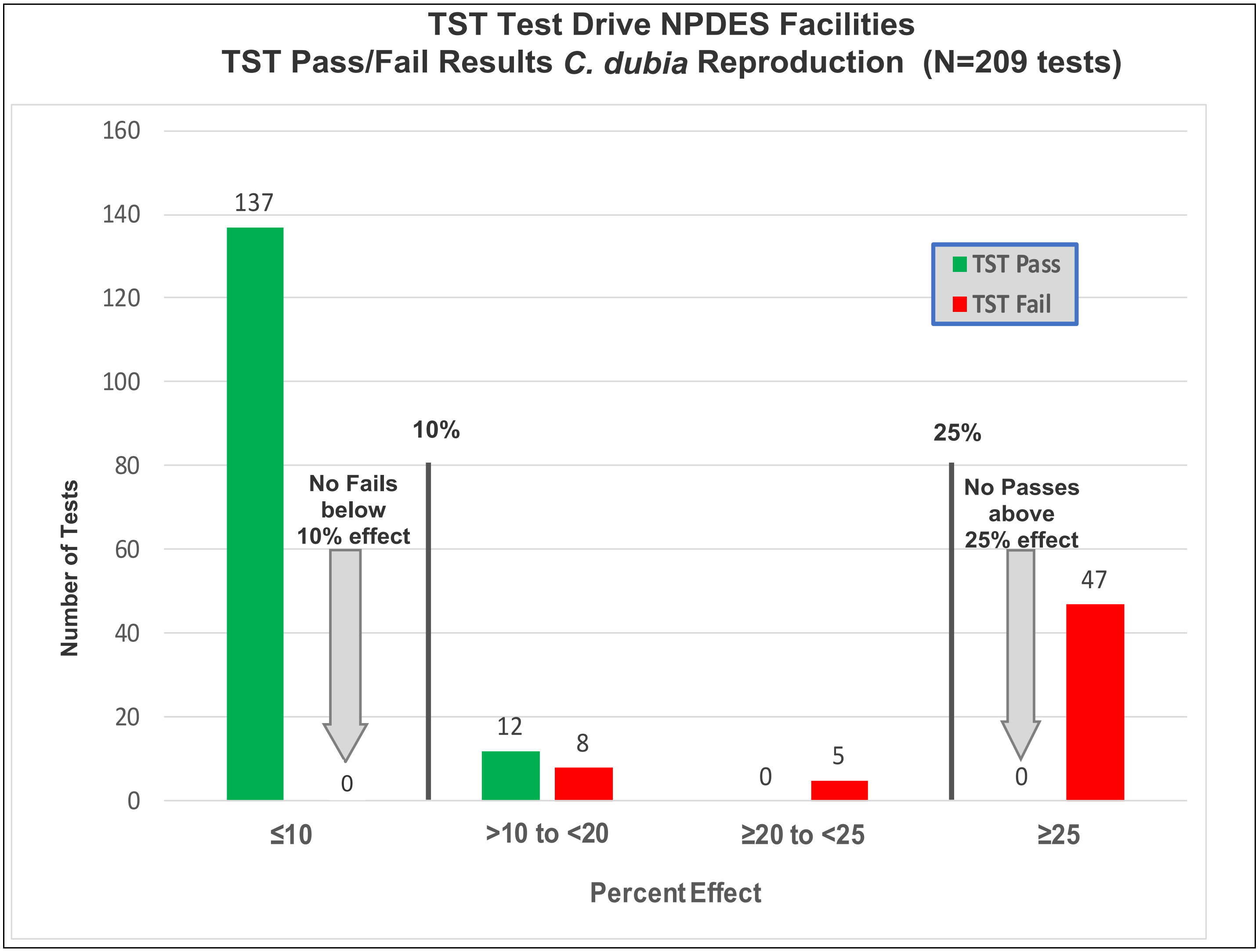


Figure J-6. TST Test Drive Results for NPDES Facilities Using the TST Analysis



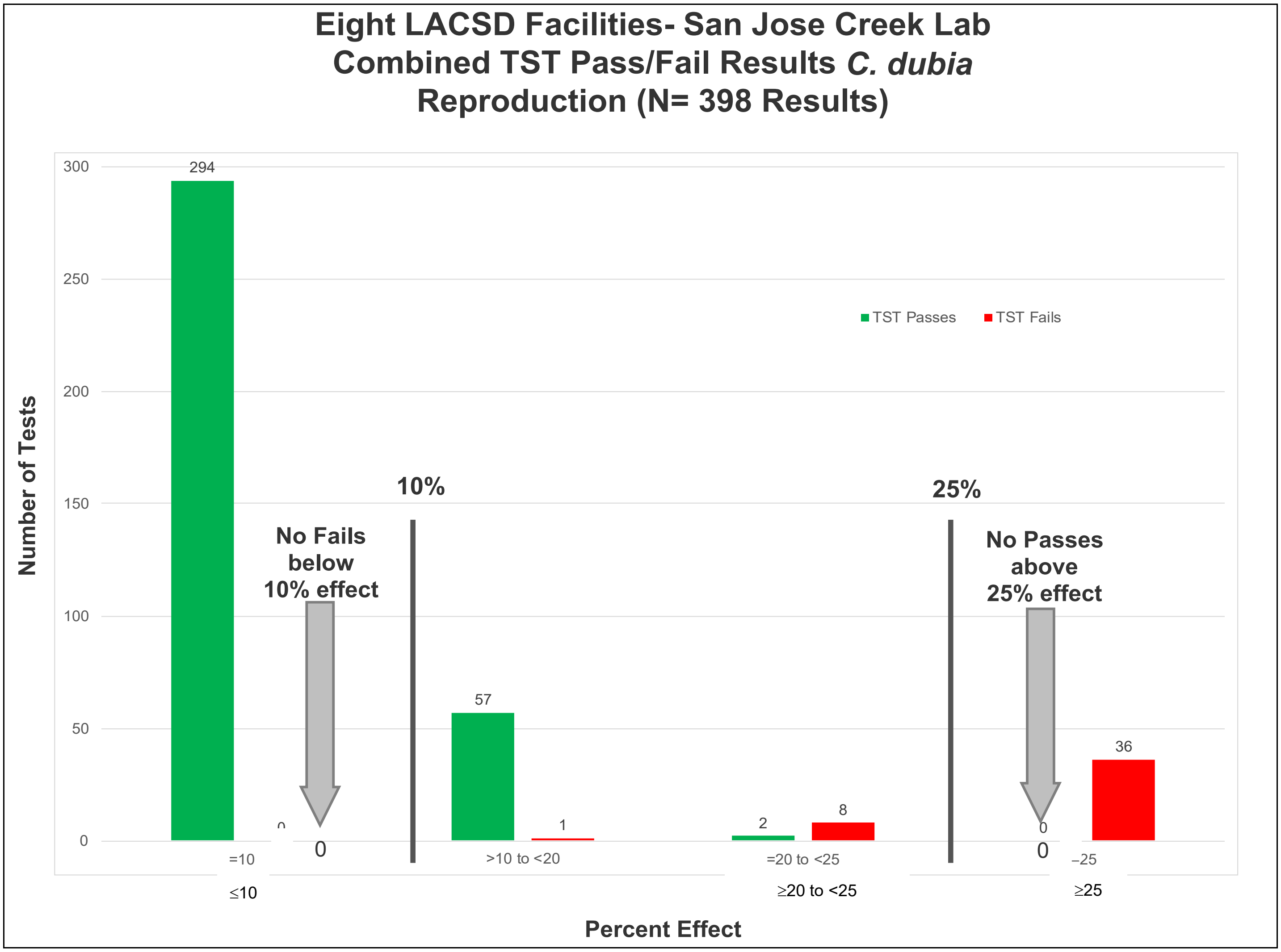
TST Passes and Fails by Percent Effect for LACSD Municipal Laboratory TST Results

The discussion above of LACSD Municipal Laboratory performance shows strong statistical power for meeting the RMD and low probability of declaring a sample toxic when the percent effect is equal to or less than 10 percent.

State Water Board staff analyzed 398 chronic *C. dubia* reproduction toxicity test results generated between 2015 and 2019 for eight LACSD facilities. The majority of the tests were conducted by the LACSD Municipal Laboratory. Figure J-7 shows the toxicity data evaluated using the TST statistical approach and highlights the number of times tests resulted in a fail or a pass and the associated percent effect.

There were no results of a fail when the percent effect was 10 percent or less. There was one fail in the 10 to 20 percent range (at 19.4 percent effect), and eight fails between 20 and 25 percent effect. There were no results of a pass when the percent effect was 25 percent or greater.

Figure J-7. LACSD Municipal Laboratory TST Test Results

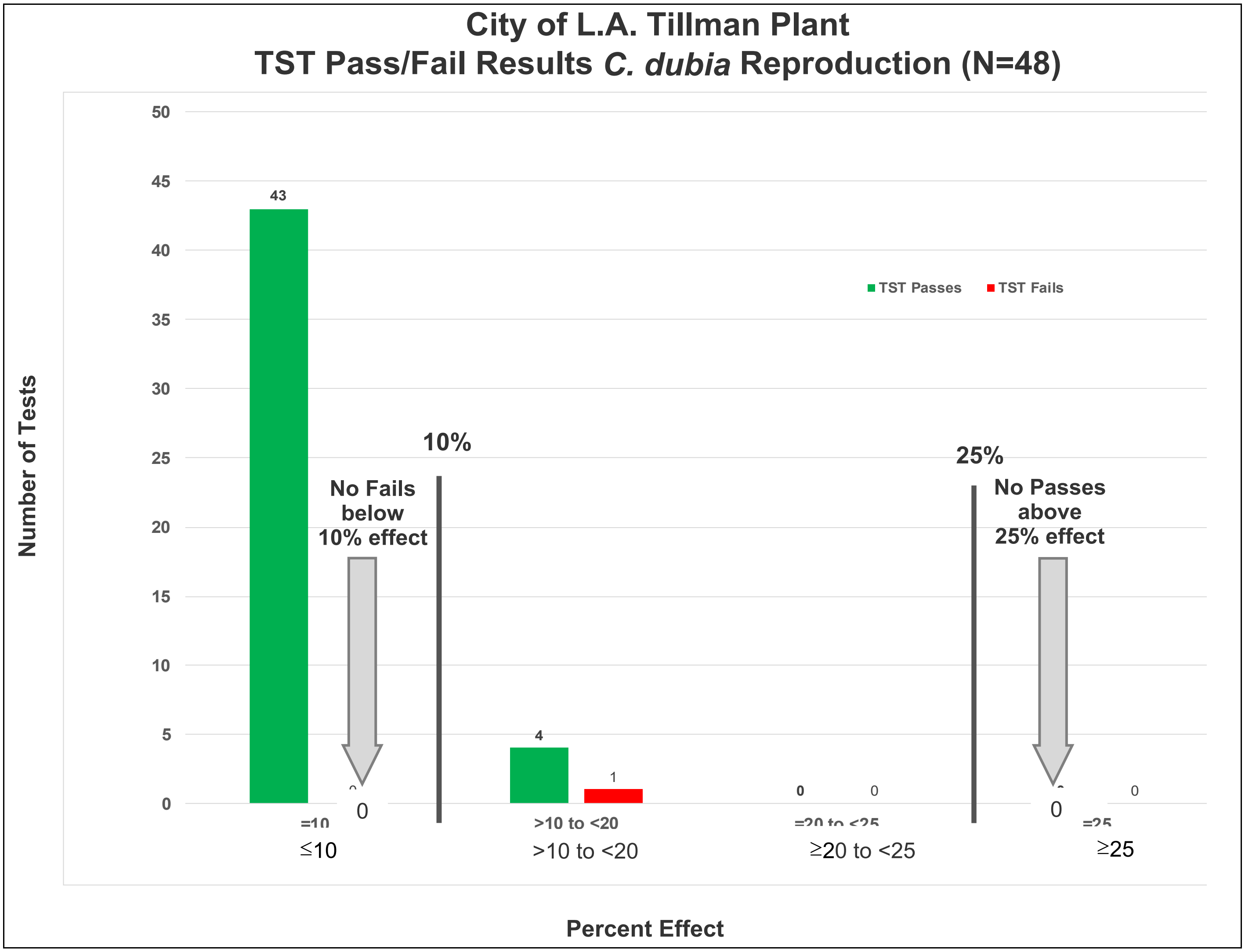


The absence of fails at or below the 10 percent effect and passes above the 25 percent effect is consistent with the probability curves in Figure J-2 when applied to the median control CV for LACSD Municipal Laboratory. LACSD Municipal Laboratory uses 20 replicates for testing the control water and the IWC. Given their most recent median control CV of 0.13, the probability of declaring a sample a fail is less than one percent when the percent effect is 10 percent or less. Additionally, the eight fails between 20 and 25 percent effect are consistent with the probability curve as well. As the percent effect approaches 25 percent, the probability of declaring a sample toxic increases.

TST Passes and Fails by Percent Effect for the City of Los Angeles Test Results

Staff analyzed 48 chronic *C. dubia* reproduction toxicity test results from the City of Los Angeles' Donald C. Tillman Water Reclamation Plant. Figure J-8 shows the toxicity data evaluated using the TST statistical approach and highlights the number of times tests resulted in a fail or a pass and the associated percent effect. There were no results of a fail when the percent effect was 10 percent or less. There were no results of a pass when the percent effect was 25 percent or greater.

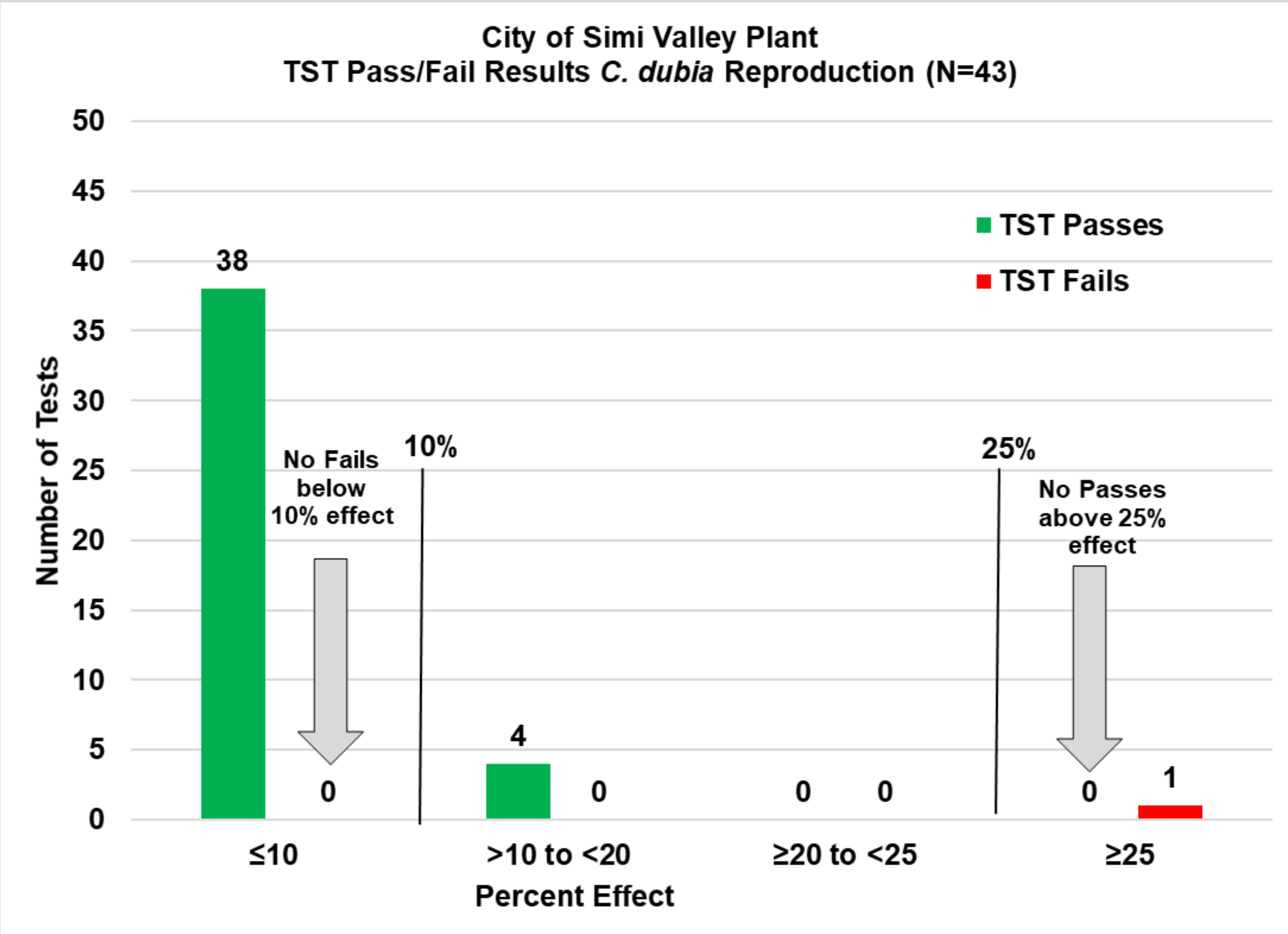
Figure J-8. City of L.A. Tillman Plant TST Test Results



TST Passes and Fails by Percent Effect for City of Simi Valley Test Results

Staff analyzed 43 chronic *C. dubia* reproduction toxicity test results from the City of Simi Valley's Wastewater Treatment Plant. Figure J-9 shows the toxicity data evaluated using the TST statistical approach and highlights the number of times tests resulted in a fail or a pass and the associated percent effect. There were no results of a fail when the percent effect was 10 percent or less. There were no results of a pass when the percent effect was 25 percent or greater.

Figure J-9. City of L.A. Simi Valley Plant TST Test Results

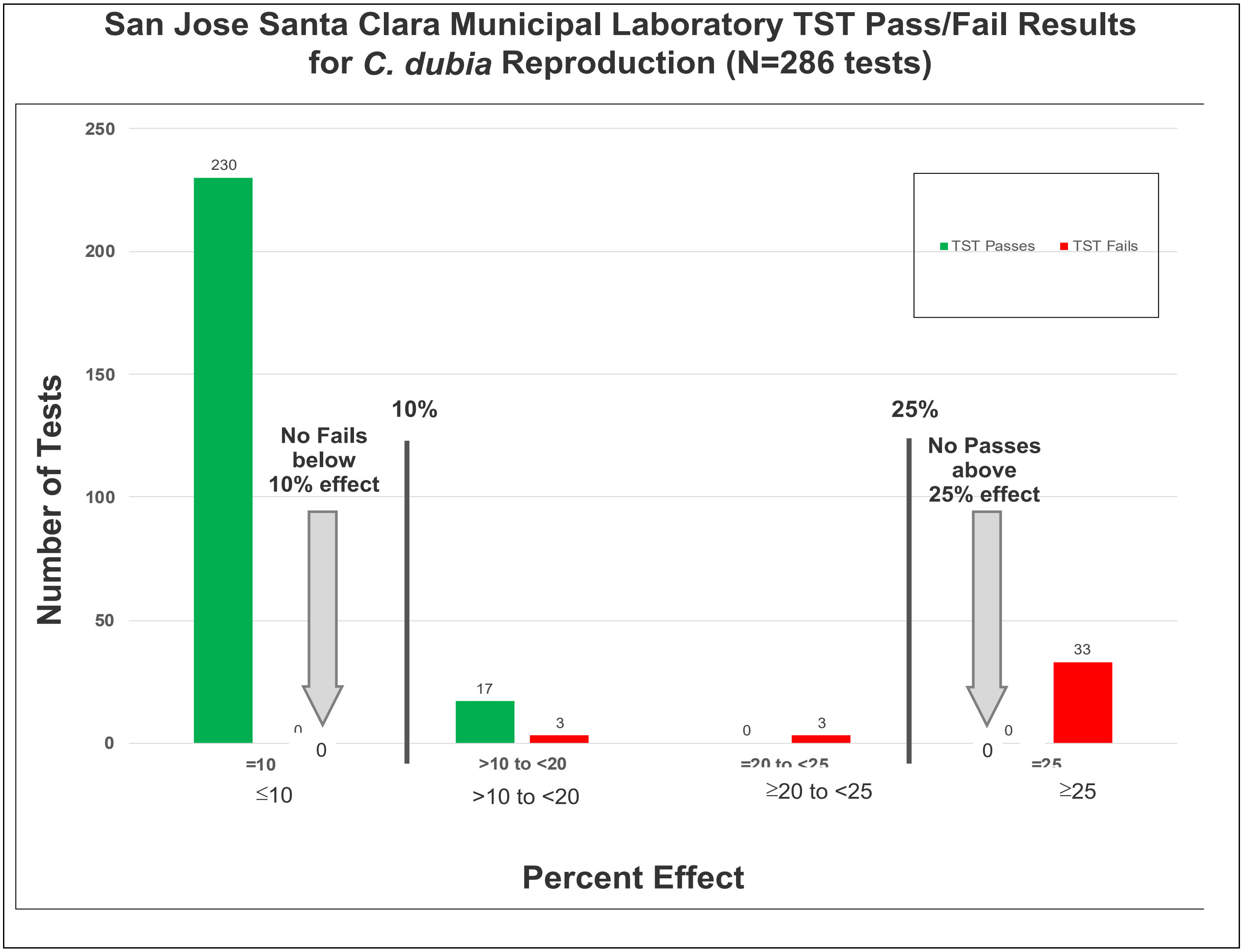


TST Passes and Fails by Percent Effect for the San Jose Santa Clara Municipal Laboratory Test Results

State Water Board staff analyzed 286 chronic *C. dubia* reproduction toxicity test results conducted between 1996 and 2016 by the San Jose Santa Clara Municipal Laboratory. For some test results, the data show a mean percent effect as a negative value, meaning the mean number of neonates in the IWC sample was higher than the mean number of neonates in the control water. Other data lacked percent effect values but were labelled as stimulatory (i.e. the effluent sample stimulated higher reproduction in the IWC treatment compared to the control). The laboratory grouped data from both of these categories with tests that had a percent effect from zero to 10 percent.[25] State Water Board staff considered all these data to be at a less than or equal to 10 percent effect level. Figure J-10 shows the toxicity data evaluated using the TST statistical approach and highlights the number of times tests resulted in a fail or a pass and the associated percent effect.

There were no results of a fail when the percent effect was 10 percent or less. There were no results of a pass when the percent effect was 25 percent or greater.

Figure J-10. San Jose Santa Clara Municipal Laboratory TST Test Results



[25] This data set reflects the changes over 20 years in laboratory data entry for aquatic toxicity tests. Researchers assessed 20 recent CV values from this laboratory and found it to have the highest precision of the laboratories studied (Fox et al. 2019).

TST Passes and Fails by Percent Effect for the Hawaii TST Test Drive

The City and County of Honolulu conducted an internal data analysis similar to California's TST Test Drive (Vazquez 2012). The Hawaii TST Test Drive evaluated 255 chronic *C. dubia* reproduction toxicity test results conducted between 2007 and 2012 from four NPDES-permitted wastewater treatment plants in Hawaii. Data were assessed using both the NOEC and TST statistical approaches.

When using the TST statistical approach, there were no results of a fail when the percent effect was 10 percent or less, and there were four fails in the 15 to 25 percent effect range. When using the NOEC statistical approach, there were no fails in the 15 to 25 percent effect range. There were no results provided at a percent effect of 25 percent or greater.

Vazquez 2012 concluded on page 7 that:

> Toxic effects of effluents on C. *dubia* reproduction are difficult to detect with the NOEC approach because of the inherent within-test variability of this chronic WET test. The alternative TST procedure controls false negatives and identifies toxicity that may have potential adverse environmental effects.

Vazquez 2012 also concluded on page 7 that:

> The failures [in the 15 to 25 percent effect range] declared by TST in this study were very rare excursions caused by an episode of unusually poor C. *dubia* culture performance. While blocking by parentage minimizes within-test variability, the effect of limited fecundity or mortality of even a single organism may be remarkable. For this reason, there must be an extremely thorough oversight of laboratory protocols to ensure consistent organism vigor. In addition, increased replication in the control and in the sample at the IWC may be adopted to decrease variance.

For the four fails identified between a 15 and 25 percent effect using the TST statistical approach, the single test control CVs ranged from 0.28 to 0.36, indicating higher within-test variability. The City and County of Honolulu acknowledge this issue of precision in the conclusion above. By using the probability curve in Figure J-2 that corresponds to a CV of 0.3 and 10 replicates, it is more likely that use of the TST will declare toxicity at a 15 to 25 percent effect range than the NOEC statistical approach. However, the review of a single test control CV is not a complete analysis of toxicity test performance nor within-laboratory variability.

In December 2013, Hawaii's Department of Health adopted the TST statistical approach for assessing toxicity to evaluate the combined impact of all pollutants on aquatic organisms for Clean Water Act regulations (Hawaii State Department of Health 2015).

J.5. The Probability of a Violation and TRE Based on Laboratory Performance

Much of the analyses (SWRCB 2011, Vazquez 2012, Diamond 2013, Fox et al. 2019) and discussion above focuses on the probabilities and occurrences of a single test fail or pass. The Toxicity Provisions include MMELs designed to address possible effects of a discharge over a period of a calendar month. When a chronic or acute routine monitoring test results in a fail of the TST, the discharger would be required to conduct up to two MMEL compliance tests, initiated within the same calendar month. A violation of the MMEL occurs when two or more tests result in a fail in a calendar month. A TRE would be required when there are two aquatic toxicity effluent limitation violations (MMEL or MDEL) in a calendar month or in consecutive calendar months.

At the request of State Water Board staff, Dr. John Fox prepared a memorandum titled *Probability of Failing TST and WET Maximum Monthly Effluent Limit* (Fox 2019). The memorandum includes statistical analyses of probabilities of TST fails when the percent effect is at 10 percent or less, the probabilities of these fails resulting in a violation of effluent limitations, and the probabilities of two violations based on these fails resulting in the requirement to conduct a TRE. Dr. Fox found that, by requiring two out of three TST test fails before receiving a MMEL violation, the probabilities of receiving a MMEL violation based on a fail at or below the 10 percent effect are low. As a result, the probabilities of violations occurring based on a fail at or below the 10 percent effect that ultimately require a TRE are even lower.

The probability of a maximum daily effluent limitation (MDEL) violation occurring in combination with a MMEL violation, and the subsequent TRE requirement, is not applicable in this discussion. The MDEL is violated when the test results in a fail of the TST and a 50 percent effect in the survival endpoint. At that percent effect level, the sample will always be declared toxic, independent of the laboratory precision.

Probability of Declaring Toxicity for a Single Test Based on Laboratory Precision

Table J-5 shows the probabilities of declaring a sample toxic at the different percent effects when using the TST statistical approach, as calculated by Dr. Fox. The probabilities depend on the within-test variability, which is expressed by the median control CV value over time, and the number of replicates used in the toxicity test.

In order to illustrate the probabilities associated with a MMEL violation and initiation of a TRE, a laboratory control CV of 0.15 was selected. This is the median CV value for the eight California laboratories assessed by Fox et al. 2019 and summarized in Table J-2. Additionally, the control CV of 0.15 is appropriate for this analysis as 0.15 is close to or higher than several median control CV values for the laboratory data summarized in Tables J-3 and J-4.

With a control CV of 0.15 and 10 replicates, there is a 4.8 percent probability of the TST statistical analysis resulting in a fail with a percent effect less than or equal to 10%. This is less than the five percent probability deemed acceptable. When the number of replicates increases to 20, there is a 0.3 percent probability of the TST statistical analysis resulting in a fail with a percent effect less than or equal to 10%.

Table J-5. Probability of Declaring Toxicity for Different Percent Effects Based on Laboratory Performance as Measured by the Median CV

Probability of failing TST for specified parameters percent effect and control CV, using 10 replicates	**Percent Effect: 0%**	**Percent Effect: 10%**	**Percent Effect: 25%**	**Percent Effect: 50%**
Control CV: 0.100	0.000	0.002	0.800	1.000
Control CV: 0.150	0.000	0.048	0.800	1.000
Control CV: 0.200	0.011	0.150	0.800	1.000
Control CV: 0.300	0.107	0.341	0.800	0.998
Control CV: 0.400	0.235	0.461	0.800	0.992
Probability of failing TST for specified parameters percent effect and control CV, using 20 replicates	**Percent Effect: 0%**	**Percent Effect: 10%**	**Percent Effect: 25%**	**Percent Effect: 50%**
Control CV: 0.100	0.0000	0.0000	0.8000	1.0000
Control CV: 0.150	0.0000	0.0030	0.8000	1.0000
Control CV: 0.200	0.0000	0.0340	0.8000	1.0000
Control CV: 0.300	0.0170	0.1740	0.8000	1.0000
Control CV: 0.400	0.0830	0.3110	0.8000	0.9990
Probability of failing TST for specified parameters percent effect and control CV, using 30 replicates	**Percent Effect: 0%**	**Percent Effect: 10%**	**Percent Effect: 25%**	**Percent Effect: 50%**
Control CV: 0.100	0.0000	0.0000	0.8000	1.0000
Control CV: 0.150	0.0000	0.0000	0.8000	1.0000
Control CV: 0.200	0.0000	0.0070	0.8000	1.0000
Control CV: 0.300	0.0030	0.0900	0.8000	1.0000
Control CV: 0.400	0.0300	0.2130	0.8000	1.0000

Probability of a MMEL Violation Based on the False Positive Rate

In Dr. Fox's simulation, he points out that for each of the up to three tests conducted in a row to determine MMEL compliance, laboratory control CV, percent effect, and number of replicates may vary. For this probability simulation, each of the tests' probabilities (p) of failing the TST at or below 10 percent effect are assumed to be the same (p1=p2=p3) and independent of each successive TST failure.

Table J-6 shows probability of a MMEL violation based on TST fails at or below 10 percent effect. Continuing with the illustration, for a control CV of 0.15 and 10 replicates, the probability (p) is 0.048 (less than five percent) of declaring the test a fail. With more than one test needed to result in an MMEL violation, there is only a 0.49 percent probability of a MMEL violation based on the false positive probability, which is 10 times less likely than the probability of a single test fail.

Table J-6. Probability of a MMEL Violation Based on TST Fails at or Below 10 Percent Effect

Probability of each test in simulation	p = Probability of a Fail ≤ 10 Percent Effect	Probability of a MMEL Violation
p1 = p2 = p3	0.05	0.0049
p1 = p2 = p3	0.10	0.0190
p1 = p2 = p3	0.15	0.0416
p1 = p2 = p3	0.20	0.0720
p1 = p2 = p3	0.25	0.1094

Probability of a MMEL Violation Based on the Probability of a Fail at or below 10 Percent Effect for Specific California Laboratories

The example above was based on the median CV value of 0.15 for multiple California laboratories. Using the specific California laboratory median control CV values, the probability of a MMEL violation based on the probability of a fail at or below 10 percent effect can be estimated for each laboratory. Table J-7 shows specific California laboratory median CV values and the probability of a MMEL violation (based on data provided by Dr. Fox). When using 10 replicates, all laboratories except Commercial Laboratory A are below a one percent chance of a MMEL violation based on the probability of fail at a 10 percent or less effect (Commercial Laboratory A has less than an 8.62 percent chance). When increasing the number of replicates to 20, all of the laboratories except Commercial Laboratory A are well below a 0.1 percent chance of a MMEL violation based on the probability of fail at a 10 percent or less effect (Commercial Laboratory A has a less than one percent chance).

Table J-7. Probability of a MMEL Violation Based on the False Positive Rate for Specific California Laboratories

Laboratory[1]	Median Control CV	p= Probability[2] of a Fail, PE ≤ 10% (N=10)	Probability[2] of a MMEL Violation (N=10)	p= Probability[2] of a Fail, PE≤ 10% (N=20)	Probability[2] of a MMEL Violation (N=20)
A-Commercial Laboratory[3]	0.23	0.215	<0.0862	0.069	<0.0095
B-Commercial Laboratory[3]	0.15	0.048	<0.0049	0.003	<0.0002
E-Commercial Laboratory[3]	0.11	0.005	<0.0002	<0.001	<0.0002
F-San Jose Santa Clara Laboratory[3]	0.11	0.005	<0.0002	<0.001	<0.0002
Commercial Laboratory #1	0.08	<0.001	<0.0002	<0.001	<0.0002
Commercial Laboratory #2	0.12	0.011	<0.0008	<0.001	<0.0002
Commercial Laboratory #3	0.16	0.066	0.0095	0.006	<0.0002
LACSD San Jose Creek Laboratory 2017-18	0.13	0.020	0.0008	0.001	<0.0002

[1] In this analysis there are three unknown California laboratories (laboratories A, B, C) from the Fox et al. 2019 study and three unknown California laboratories (laboratories 1, 2, 3) analyzed by State Water Board staff. Because the names are not known, there is the possibility that the two sets include the same laboratories. Therefore, there could be as few as five separate laboratories total, and as many as eight included in this analysis. The data sets do not overlap temporally, therefore the analysis of the eight data sets are at a minimum, unique.

[2] Probabilities from or estimated from data provided in Fox 2019 Memo. Probabilities assume that standard deviation for the control is equal to standard deviation for the IWC treatment (this assumption is discussed in Fox et al. 2019 and the Fox 2019 Memo).

[3] Laboratory data from Fox et al. 2019.

Probability of a Toxicity Reduction Evaluation Based on the False Positive Rate

Dr. Fox calculated the probability of two successive MMEL failures over a five-year period of time, based on the probabilities calculated in the previous two steps.

Table J-8 shows the range of probabilities. Continuing with the illustration for the median control CV of 0.15, using 10 replicates, there is a 4.8 percent probability of the TST declaring a fail when the percent effect is 10 percent or less, and a 0.49 percent probability of a MMEL violation based on fails at or below 10 percent effect. Based on these assumptions, there is a 0.00238 percent probability that a TRE will be required based on fails at or below 10 percent effect.

State Water Board staff used the probabilities provided by Dr. Fox in his memorandum and applied those probabilities to California laboratory CV data presented in this appendix. Table J-9 shows the results of this analysis. For seven of the eight laboratories, when using 10 replicates, there is less than 9 thousandths of one percent (0.009% or 0.00009) probability that a TRE would be required due to fails below at or 10 percent effect when using 10 replicates. For one of the laboratories, Laboratory A, there is a still less than 8 tenths of one percent (0.742% or 0.00742) probability that a TRE would be required because of high within-test variability (as expressed by a high median control CV of 0.23, which is shown in Table J-7).

Adding replicates to the toxicity test reduces the probability that a TRE would be required by TST fails at or below 10 percent effect.

Table J-8. Probabilities that a TRE would be Required Based on the False Positive Rate and a Replicate Number of 10

Probability of at least one run of 2 or more MMEL failures		
Probability *p* of a fail of a routine monitoring test	**P_V[1], probability of MMEL violation in a calendar month**	**Probability of one or more runs (2 successive MMEL failures) in 60 months, resulting in TRE (based on P_V)[2]**
0.02	0.000792	0.000000627264
0.03	0.001773	0.000003143529
0.04	0.003136	0.00000983
0.05	0.004875	0.0000238
0.06	0.006984	0.0000488
0.07	0.009457	0.0000894
0.08	0.012288	0.00015099
0.09	0.015471	0.00023935
0.1	0.019	0.000361
0.11	0.022869	0.00052299
0.12	0.027072	0.00073289
0.13	0.031603	0.00099875
0.14	0.036456	0.00132904
0.15	0.041625	0.00173264
0.16	0.047104	0.00221879
0.17	0.052887	0.00279703
0.18	0.058968	0.00347723

Probability of at least one run of 2 or more MMEL failures		
Probability *p* of a fail of a routine monitoring test	P_V[1], probability of MMEL violation in a calendar month	Probability of one or more runs (2 successive MMEL failures) in 60 months, resulting in TRE (based on P_V)[2]
0.19	0.065341	0.00426945
0.2	0.072	0.005184
0.21	0.078939	0.00623137
0.22	0.086152	0.00742217
0.23	0.093633	0.00876714
0.24	0.101376	0.01027709
0.25	0.109375	0.01196289

[1] $P_V = p*p + p*(1-p)*p$

[2] Average of six simulation runs, each consisting of 10,000 simulated sequences of 60 months

Table J-9. California Laboratory Estimated Probabilities of a Two Successive MMEL Failures

Laboratory[1]	N=10 Probability of MMEL violation each month	Probability of 2 successive MMEL failures in 60 months, resulting in TRE (N=10)	N=20 Probability of MMEL violation each month	Probability of 2 successive MMEL failures in 60 months, resulting in TRE (N=20)
A-Commercial Laboratory[2]	<0.0862	<0.00742	<0.0095	<0.0000894
B-Commercial Laboratory[2]	<0.0049	<0.0000238	<0.0002	<0.000000627

Laboratory[1]	N=10 Probability of MMEL violation each month	Probability of 2 successive MMEL failures in 60 months, resulting in TRE (N=10)	N=20 Probability of MMEL violation each month	Probability of 2 successive MMEL failures in 60 months, resulting in TRE (N=20)
E-Commercial Laboratory[2]	<0.0002	<0.000000627	<0.0002	<0.000000627
F-San Jose Santa Clara Municipal Laboratory[2]	<0.0002	<0.000000627	<0.0002	<0.000000627
Commercial Laboratory #1[3]	<0.0002	<0.000000627	<0.0002	<0.000000627
Commercial Laboratory #2	<0.0008	<0.000000627	<0.0002	<0.000000627
Commercial Laboratory #3	0.0095	0.0000894	<0.0002	<0.000000627
LACSD Municipal Laboratory 2017-18	0.0008	<0.000000627	<0.0002	<0.000000627

[1] In this analysis there are three unknown California laboratories (laboratories A, B, C) from the Fox et al. 2019 study and three unknown California laboratories (laboratories 1, 2, 3) analyzed by State Water Board staff. Because the names are not known, there is the possibility that the two sets include the same laboratories. Therefore, there could be as a few as five separate laboratories total, and as many as eight included in this analysis. The data sets do not overlap temporally, therefore the analysis of the eight data sets are at a minimum, unique.

[2] Laboratory data from Fox et al. 2019

[3] Probabilities from or estimated from Tables J-7 and J-8.

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Appendix K. Survey of Laboratory Toxicity Testing Logistical Capacities

K.1 Background

State Water Board staff surveyed 23 laboratories accredited by the California Environmental Laboratory Accreditation Program (ELAP) to conduct chronic whole effluent toxicity (WET) testing to better understand the logistics of conducting toxicity tests and associated costs. Out of the 23 laboratories, 20 responded to the survey questions, either via e-mail or by phone. Three out of the 20 laboratories stated that they are ELAP accredited but do not conduct WET testing for purposes of compliance with Water Board permits. These laboratories still provided a response for the applicable survey questions. The survey questions and summary of the laboratories' responses are listed below.

K.2 Survey Questions and Summary Responses

1. Logistically, how long does it take to conduct a whole effluent toxicity test using the Test of Significant Toxicity (TST) statistical approach from the start of the test until you receive preliminary results and inform the client that the test resulted in a "pass" or a "fail"?

Summary Response: The time to conduct each toxicity test and receive preliminary results is species-dependent but may take up to 10 days for common tests, such as the chronic *Ceriodaphnia dubia* (*C. dubia*) reproduction test. Generally, laboratories can notify clients with preliminary results within 24 to 48 hours after completion of the test.

2. How much notice do you need to initiate a chronic whole effluent toxicity test? If it is species-dependent, please indicate how much notice you need to initiate the test for each test species.

Summary Response: Responses varied depending on what species the laboratory uses and how the organisms are obtained. Most laboratories prefer at least one week notice before initiating a toxicity test to order organisms, prepare equipment, and plan tests. Many laboratories culture their organisms in-house and require one to two days notice to initiate a toxicity test. Some laboratories may require more than one week notice to obtain certain species. For example, some laboratories that test with species collected from the ocean, such as giant kelp, may require scuba divers to collect a new set of organisms before they can conduct a second or third test.

3. Do you have a contingency plan for when a toxicity test does not meet the Test Acceptability Criteria (TAC) to ensure that your client's or facility's monitoring requirements are met?

Summary Response: In situations when the test does not meet TAC, the laboratories will immediately notify the client, request the client collect another sample, and restart the test.

Many laboratories expressed that failing to meet TAC does not happen often because they maintain high quality assurance. In addition, some laboratories have back up organisms and resources to restart a test that does not meet TAC. In the situation when an organism culture is unusable, the laboratories may send the samples to a subcontracted laboratory. Two laboratories mentioned that they try to initiate the first test as close to the beginning of the monitoring period as possible so there is extra time to sample again if necessary.

4. If you are unable to conduct a test that a client requests or your facility is required to conduct due to capacity or other constraints, what is the contingency plan to fulfill the testing requirement (e.g., subcontract with other laboratories)? Does your contract with your client include language to address such contingencies?

Summary Response: In situations when the laboratory has capacity issues or other constraints, most of the laboratories send the samples to a subcontracted laboratory. However, this issue does not occur often. Four laboratories mentioned that they do not subcontract to other laboratories at all. Two larger laboratories maintain sufficient capacity, one laboratory maintains flexibility in their scheduling, and one laboratory reserves 30 percent of their testing capacity for “emergencies.” Some laboratories include contingency language in their contract, and some do not.

5. Do you charge clients for toxicity tests that they request but are subsequently canceled? If so, how much?

Summary Response: The laboratories do not charge their clients for cancelled tests, as long as the test has not been started and no expenses have been incurred. However, the laboratories do charge for incurred expenses (e.g., cost of purchasing test organisms, courier fees, etc.). If the test is cancelled after it has been initiated, laboratories charge a prorated fee based on the time and effort the laboratory expended.

6. Do you charge more for unexpected or unscheduled tests?

Summary Response: Laboratories do not charge extra for unscheduled tests. However, one laboratory noted that they may start charging extra for weekend and/or holiday work if the demand increases significantly. Another laboratory noted that they charge extra for expedited results.

7. How much do you charge for a regularly scheduled, chronic whole effluent toxicity test? Is it species specific?

Summary Response: Six of the 20 laboratories that responded to the survey were willing to share species-specific pricing information. Three of the laboratories were commercial laboratories and three were municipal laboratories. However, one of the municipal laboratories currently outsources their toxicity tests and reported the costs that they are charged by their contracted laboratory. The remaining two municipal laboratories conduct toxicity tests for their own discharge facilities.

The price of each toxicity test was dependent on the individual laboratory, test species, test method, number of required test concentrations, frequency of required reference toxicant test, and workload requirements of the test. For three commercial laboratories, and one municipal laboratory that outsources, when adjusted for inflation, 10 out of the 12 prices reported for conducting multiple concentration toxicity tests were within the range of costs listed in Exhibit 4-4 of the 2018 Economic Report prepared by Abt Associates, Inc. (Abt Associates Inc. et al., 2018). The two municipal laboratories reported much higher costs per toxicity test than those in the 2018 Economic Report.

K.3 Findings on Calendar Month Timeline

The Toxicity Provisions would require a discharger to initiate up to two median monthly effluent limitation (MMEL) compliance tests within the same calendar month as the routine monitoring test whenever a routine monitoring test results in a "fail." Based on the results of the survey, if a laboratory begins a six to eight day toxicity test at the start of the calendar month, they should have the test result within seven to 10 days. If the toxicity test results in a "fail," some laboratories indicated they begin the first MMEL compliance test within one day of the "fail," while other laboratories indicated they take up to one week to initiate their first MMEL compliance test, depending on the test species. Therefore, the first MMEL compliance test could be initiated somewhere between day eight to day 17 of the calendar month, and test results could be available after an additional seven to 10 days. Dischargers will know if they need to initiate a second MMEL compliance test between day 15 and day 27 of the calendar month. The second MMEL compliance test could be initiated somewhere between day 16 and day 28 of the calendar month, if it is required. A practicable timeframe for completing the MMEL compliance tests is summarized in Table K-1.

Table K-1. Practicable Timeframe for Initiating MMEL Compliance Tests

Test	Test Initiation Starts On:	Test Results Available On:
MMEL Routine Monitoring Test	Day 1	Day 7 to 10
1st MMEL Compliance Test	Day 8 to 17	Day 15 to 27
2nd MMEL Compliance Test	Day 16 to 28*	Day 23 to 38

* If required, the second MMEL compliance test must be initiated by the end of the calendar month, which will range from 28 to 31 days in length.

The survey responses indicate there is sufficient time for dischargers to initiate one MMEL routine monitoring test and two MMEL compliance tests within the same calendar month, if the routine monitoring test is initiated at or near the beginning of the calendar month. In addition, good communication and coordination between the dischargers and their laboratories is important to make sure that samples are collected and MMEL compliance tests are initiated promptly whenever a routine monitoring test results in a "fail." At the discretion of the Regional Water Boards, additional time may be granted to dischargers to initiate the required monitoring tests when the delay is due to circumstances outside the discharger's control that were not preventable with the reasonable exercise of care and the discharger promptly initiates and completes the replacement test.

The survey responses also indicate that the size of the laboratory and laboratory staff availability impact the feasibility of conducting multiple toxicity tests in a calendar month. Compared to larger laboratories, smaller laboratories generally require more time to obtain test species, set up tests, and start unscheduled tests due to fewer staff, capacity, and resources. Larger laboratories did not express as much concern with capacity constraints or scheduling difficulties. The survey also found that conducting toxicity tests requires planning, preparation, and communication between laboratories and their clients.