ROBERT A. RYAN, JR., ESQ.,
County Counsel (SBN 69335)
LISA A. TRAVIS, ESQ.,
Supervising Deputy County Counsel (SBN 184793)
COUNTY OF SACRAMENTO
700 H Street, Suite 2650
Sacramento, CA 95814
Telephone: (916) 874-5544
Facsimile: (916) 874-8207

SOMACH SIMMONS & DUNN
A Professional Corporation
PAUL S. SIMMONS, ESQ. (SBN 127920)
THERESA A. DUNHAM, ESQ. (SBN 187644)
ROBERTA L. LARSON, ESQ. (SBN 191705)
CASSIE N. AW-YANG, ESQ. (SBN 233697)
500 Capitol Mall, Suite 1000
Sacramento, CA 95814
Telephone: (916) 446-7979
Facsimile: (916) 446-8199

Attorneys for Petitioner
SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT

BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

In the Matter of the Sacramento Regional County Sanitation District's Petition for Review of Action and Failure to Act by Regional Water Quality Control Board, Central Valley Region, in Adopting Waste Discharge Requirements Order No. R5-2010-0114 (NPDES No. CA0077682) and Time Schedule Order No. R5-2010-0115 for Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant.	SWRCB/OCC File No. __________ PETITION FOR REVIEW (Wat. Code, § 13320)

Petitioner Sacramento Regional County Sanitation District (District or SRCSD), in accordance with section 13320 of the Water Code and sections 2050 et seq. of Title 23 of the California Code of Regulations, hereby petitions for review of Waste Discharge Requirements Order No. R5-2010-0114 (NPDES No. CA0077682) and Time Schedule Order No. R5-2010-0115 of the Central Valley Regional Water Quality Control Board (Regional Board or RWQCB) and action or inaction of the RWQCB associated therewith.

1. NAME, ADDRESS, TELEPHONE NUMBER, AND EMAIL ADDRESS OF THE PETITIONER

Petitioner is the District, which owns and operates the Sacramento Wastewater Treatment Plant (SRWTP). Petitioner's contact information is as follows:

Sacramento Regional County Sanitation District
c/o Stan R. Dean
District Engineer
10060 Goethe Road
Sacramento, CA 95827-3553
Telephone: (916) 876-6000
Facsimile: (916) 876-6160
Email: deans@sacsewer.com

In addition, all materials in connection with this Petition, and the administrative record, should be provided to:

Somach Simmons & Dunn
A Professional Corporation
Paul S. Simmons, Esq.
Theresa A. Dunham, Esq.
500 Capitol Mall, Suite 1000
Sacramento, CA 95814
Telephone: (916) 446-7979
Facsimile: (916) 446-8199
Email: psimmons@somachlaw.com
Email: tdunham@somachlaw.com

Robert A. Ryan, Jr., Esq., County Counsel
Lisa A. Travis, Esq., Supervising Deputy County Counsel
County of Sacramento
700 H Street, Suite 2650
Sacramento, CA 95814
Telephone: (916) 874-5544
Facsimile: (916) 874-8207
Email: ryanr@saccounty.net
Email: travisl@saccounty.net

2. THE SPECIFIC ACTION OR INACTION OF THE REGIONAL BOARD WHICH PETITION REQUESTS THE STATE BOARD TO REVIEW

The District petitions the State Water Resources Control Board (State Board) to review the Regional Board's adoption of Order No. R5-2010-0114, Waste Discharge Requirements for the Sacramento Regional Wastewater Treatment Plant (Permit), and Order No. R5-2010-0115, Time Schedule Order Requiring the Sacramento Regional County Sanitation District, Sacramento

County to Comply with Requirements Prescribed in Order No. R5-2010-0114 (TSO), and action or inaction related thereto, as more fully described herein.

A copy of the Permit is attached as Exhibit A. A copy of the TSO is attached as Exhibit B.

3. THE DATE ON WHICH THE REGIONAL BOARD ACTED OR REFUSED TO ACT

The date on which the Regional Board acted or refused to act is December 9, 2010.

4. A STATEMENT OF THE REASONS THE ACTION OR FAILURE TO ACT WAS INAPPROPRIATE OR IMPROPER

A full and complete statement of the reasons why the Regional Board's actions were inappropriate or improper is provided in the accompanying Statement of Points and Authorities.

5. THE MANNER IN WHICH PETITIONER IS AGGRIEVED

The Petitioner is aggrieved by the actions or inactions of the Regional Board because the Petitioner and its ratepayers will bear the costs of, and risks of potential liabilities arising from, the Regional Board's actions and inactions that are the subjects of this Petition.

6. THE SPECIFIC ACTION REQUESTED BY PETITIONER

The District requests that the State Board review the record, the Permit and TSO (including their Findings), and this Petition, and that the State Board issue an order or orders accomplishing all of the following:

A. Grant the District's request to consider Exhibit C to this Petition, as described in section III of the Statement of Points and Authorities below.

B. Vacate the "filtration" requirements of the Permit (discussed below in section V of the Statement of Points and Authorities), and make related, consistent, and conforming revisions, as follows:

i. Vacate all of the following:

the final effluent limitations for biochemical oxygen demand (BOD), total suspended solids (TSS), and total coliform organisms contained in sections IV.A.1.a and IV.A.1.g of the Permit (pp. 13, 15);

footnote 2 of Table 6 (p. 14 of the Permit) insofar as it relates to final effluent limitations for BOD and TSS;

footnote 1 (p. 14 of the Permit) insofar as it relates to total coliform organisms;

the Construction, Operation and Maintenance Specifications for turbidity contained in Provision VI.C.4.a of the Permit (p. 30);

the Other Special Provisions requiring wastewater to be oxidized, coagulated, filtered, or equivalent by 1 December 2020 contained in Provision VI.C.6.a;

the interim effluent limitations for BOD, TSS, and total coliform organisms contained in sections IV.A.2.a and IV.A.2.c of the Permit (p. 16); and,

the compliance schedule for Title 22 of the California Code of Regulations (Title 22), or Equivalent, Disinfection Requirements contained in Provision VI.C.7.a of the Permit (pp. 33-34) as well as the reporting requirements related thereto contained in Table E-3a footnote 13 (p. E-7) and in Table E-9 of the Permit (p. E-22);

ii. Order that the final effluent limitations under the Permit for BOD, TSS, and total coliform organisms[1] shall be as follows:

BOD: 30 mg/L and 45,286 lbs/day as a monthly averages, 45 mg/L and 67,929 lbs/day as a weekly averages, and 60 mg/L and 90,572 lbs/day as a daily maximums;

TSS: 30 mg/L and 45,286 lbs/day as a monthly averages, 45 mg/L and 67,929 lbs/day as a weekly averages, and 60 mg/L and 90,572 lbs/day as a daily maximums; and,

Total Coliform Organisms: 23 most probable number (MPN) per 100 mL, as a 7-day median, 240 MPN/100 mL, no more than once in any 30-day period, and 500 MPN/100mL, at anytime.

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[1] As reflected in section V of the Statement of Points and Authorities following, these limitations are derived from Disinfection Alternative No. 1, Sacramento County Sanitation District [sic], Sacramento Regional Wastewater Treatment Plant, Proposed Waste Discharge Requirements and Time Schedule Order (NPDES No. CA0077682); Regional Water Quality Control Board, Central Valley Region Board Meeting – 9 December 2010, Item #6 (document distributed November 24, 2010).

C. Vacate the final effluent limitations for ammonia (discussed in section IV of the Statement of Points and Authorities below) and remand the Permit ammonia limitations to the Regional Board for adoption of effluent limitations for ammonia with the consideration of dilution using the District's dynamic modeling results, and make related, consistent, and conforming revisions, as follows:

i. Vacate all of the following:

the final effluent limitations for Ammonia, Nitrogen Total (as N) contained in section VI.A.1.a of the Permit (p. 14);

footnote 2 to Table E-6 (p. 14 of the Permit) insofar as it applies to final effluent limitations for Ammonia, Nitrogen, Total (as N);

section VI.C.1.c (pp. 24-25 of the Permit) insofar as it applies to ammonia;

section VI.C.1.h (p. 25 of the Permit) (without prejudice to reinserting a similar provision on remand);

section VI.C.1.m (p. 26 of the Permit); and,

section VI.C.7.b (p. 34 of the Permit);

ii. In the course of addressing ammonia issues, grant the District's request to strike evidence and findings as provided in section VI.B.1.b.iv of the Statement of Points and Authorities; and,

iii. Order that the Interim Effluent Limitations for Ammonia, Nitrogen, Total (as N) in Table 7 of the Permit (p. 16) shall remain in effect until final limitations adopted on remand become effective; and,

iv. Remand the Permit final effluent limits for ammonia to the Regional Board and direct the Regional Board to develop effluent limitations for ammonia with consideration of allowances for acute and chronic mixing zones (60 and 350 feet downstream from diffuser, respectively); and,

direct the Regional Board to develop seasonal effluent limitations for oxygen-demanding substances if and as appropriate based on the Basin Plan water quality objective for dissolved oxygen, and based on the seasonal ultimate oxygen demand

(UOD) effluent limits contained in Ammonia Removal Alternative No. 2, Sacramento County Sanitation District [sic], Sacramento Regional Wastewater Treatment Plant, Proposed Waste Discharge Requirements and Time Schedule Order (NPDES No. CA0077682); Regional Water Quality Control Board, Central Valley Region Board Meeting – 9 December 2010, Item #6 (document distributed November 24, 2010), with applicable allowances and schedules for compliance.

D. Vacate the final effluent limitations for Nitrate, Total (as N) (discussed in section VII below in the Statement of Points and Authorities) and remand the Permit Nitrate, Total (as N) limitation and make related, consistent, and conforming changes as follows:

i. Vacate all of the following:

the final effluent limitations for Nitrate, Total (as N) contained in section IV.A.1.a (p. 14); and,

section VI.C.1.n (without prejudice to adopt a similar provision on remand);

ii. Remand the Nitrate, Total (as N) effluent limitation of the Permit to the Regional Board for adoption of final effluent limitations if and as necessary, based on the MCL for nitrate with allowance for dilution using the 30 Q5 receiving water flow.

E. With respect to the Permit Fact Sheet's section IV.D.4 titled Satisfaction of Antidegradation Policy (Permit pp. F-93 through F-99) (discussed in section VIII of the Statement of Points and Authorities below), irrespective of whether such provisions do or do not directly translate to specific ordering terms of the Permit[2], the District requests the State Board determine that the discussion and findings of such section of the Fact Sheet are improper for the reasons stated in section VIII of the Statement of Points and Authorities.

F. Vacate the final effluent limitations for copper, cyanide, and chlorpyrifos and diazinon, and vacate the chronic toxicity trigger (discussed in section IX below in the Statement of Points and Authorities) and remand the Permit for copper, cyanide, and chlorpyrifos and

[2] The Statement of Points and Authorities identifies other errors in the Fact Sheet, and this specific request does not imply concurrence with other provisions of the Fact Sheet.

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diazinon effluent limitations and chronic toxicity trigger and make related, consistent, and conforming changes as follows:

i. Vacate all of the following:

the final effluent limitations for copper contained in section IV.A.1.a of the Permit (p. 13);

the final effluent limitations for cyanide contained in section IV.A.1.a of the Permit (p. 13);

the final effluent limitations for chlorpyrifos and diazinon contained in section IV.A.1.l of the Permit (p. 15);

Time Schedule Order No. R5-2010-0115 and interim effluent limitations contained in TSO No. R5-2010-0115 insofar as they relate to chlorpyrifos and diazinon; and,

the numeric monitoring trigger for chronic whole effluent toxicity contained in section VI.C.2.a.iii of the Permit (p. 27).

ii. Remand all of the following:

the copper effluent limitations of the Permit to the Regional Board for adoption of final effluent limitations with the allowance of acute and chronic mixing zones and dilution credits at 60 and 350 feet downstream from the diffuser, respectively, as calculated with the dynamic model;

the cyanide effluent limitations of the Permit to the Regional Board for adoption of final effluent limitations with the allowance of acute and chronic mixing zones and dilution credits at 60 and 350 feet downstream from the diffuser, respectively, as calculated with the dynamic model;

the chlorpyrifos and diazinon effluent limitations of the Permit for adoption of a final effluent limitation, based on the wasteload allocation with allowance for dilution at 60 and 350 feet downstream from the diffuser, respectively;

the numeric toxicity monitoring trigger for chronic whole effluent toxicity to the Regional Board for adoption of a numeric toxicity monitoring trigger for chronic whole effluent toxicity with the allowance of chronic mixing zones and dilution credits of 13.3 as calculated with the dynamic model; and,

the Regional Board's denial for the allowance of an acute aquatic life mixing zone.

G. Vacate the monitoring requirement for N-nitrosodimethylamine (NDMA) contained in Attachment E section IV.A.1, and order that monitoring for NDMA be conducted with an appropriate test method.

H. Order any other necessary conforming changes consistent with the above or the Statement of Points and Authorities, and direct that other Findings and the Fact Sheet of the Permit are deemed modified consistent with the State Board's Order.

Finally, the Water Code and State Board's regulations provide for the issuance of stays of regional board orders in connection with a petition for review. At this time, the District believes that a stay will not be necessary so long as the Petition is timely resolved. However, the District may subsequently request a stay of one or more provisions of the Permit in accordance with the State Board's regulations.

7. A STATEMENT OF POINTS AND AUTHORITIES IN SUPPORT OF LEGAL ISSUES RAISED IN THIS PETITION

The District provides below a Statement of Points and Authorities, which includes support of the legal issues raised in this Petition.

8. A STATEMENT THAT THIS PETITION WAS SENT TO THE REGIONAL BOARD

A true and correct copy of this Petition was mailed by First Class mail on January 10, 2011, to the Regional Board at the following address:

Pamela Creedon
Executive Officer
California Regional Water Quality Control Board, Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670

As a courtesy, a true and correct copy of the Petition on compact disc (CD) was also mailed to the parties on the attached service list. Petitioner is the discharger. Therefore, Petitioner did not mail a copy of this Petition to the discharger.

9. A STATEMENT AS TO WHETHER PETITIONER RAISED THE SUBSTANTIVE ISSUES OR OBJECTIONS IN THE PETITION TO THE REGIONAL BOARD

The substantive issues or objections raised in this Petition were raised before the Regional Board.

10. PETITIONER'S REQUEST FOR CONSIDERATION OF SUPPLEMENTAL EVIDENCE

Petitioner requests that the State Board consider Exhibit C to this Petition, as discussed more fully below.

STATEMENT OF POINTS AND AUTHORITIES

I. INTRODUCTION

The Permit and TSO require State Board review and modification for numerous reasons. Overall, the Permit would result in severe consequences for the Sacramento region. Estimated compliance costs amount to over $2 billion in capital costs, coupled with additional increased operation and maintenance costs of nearly $100 million each year, all of which must be borne by the region's citizens. The Regional Board failed to give the required, meaningful consideration to the adverse impacts on residents of all economic circumstances, business and development, and the environment. These adverse impacts are not justified. The Regional Board was too committed to certain outcomes and did not consider what is reasonable and necessary in the specific circumstances of the SRWTP.

Over one-half the estimated compliance cost is for filtration technology even though Sacramento River water quality is, with the current discharge, superior to adopted water quality standards for pathogens. The record shows that the requirement would have *de minimus* benefit in terms of avoiding potential risk of gastrointestinal illness to persons who may ingest river water directly. In developing the requirements, the Regional Board did not fairly or accurately characterize evidence and ignored highly relevant, uncontroverted evidence altogether. It also deviated from its standard permitting practice for discharges to high-volume receiving waters. Further, the Regional Board gave cursory and superficial attention to its obligations under section 13241 of the Water Code, a pillar of water quality regulatory law, and its findings related to imposing the requirements are perfunctory and simply wrong. The District's predecessor permit (Order No. 5-00-188) ensured a high degree of protection related to pathogens and its provisions should have been retained.

The Permit imposes new requirements for ammonia reduction based on factors and approaches never before applied to permits in the Central Valley region. In practice, the Regional Board has based ammonia requirements in permits on the United States Environmental Protection Agency's (U.S. EPA) ambient water quality criteria for the protection of human health. In this instance, with allowance for small and approvable mixing zones, such criteria will be met at all downstream locations. The Permit denies the mixing zones not because the mixing zone itself will adversely affect beneficial uses, but because of generally-referenced impacts of much *lower* ammonia concentrations far downstream in the Delta. The Permit does not "connect the dots" in terms of explaining why the specific limitations are necessary for protection of uses downstream. Aside from this significant regulatory error, the Permit also falls prey to the rush to "do something" in regard to the deteriorated state of certain aquatic resources in the Delta. Inceptive scientific investigation is not a cause for imposing severe burdens on the Sacramento region. As the State Board is aware, the District has been targeted in this regard, but the State Board's own hearings just last year revealed that there is not a "smoking gun" associated with SRWTP discharges. Hypotheses of a few years ago have been discarded, but the Regional Board seized on other, freshly minted hypotheses and improper conclusions to impose these costly requirements. The District has recognized that some degree of ammonia reduction will be necessary to ensure that conservative, adopted standards for dissolved oxygen are met at all times. The proper course for the State Board is to direct the Regional Board to adopt limits on oxygen demand to implement dissolved oxygen standards, with the reservation that the Permit can be reopened if a solid scientific basis for more stringent ammonia limits emerges.

The Permit's limitations on nitrate suffer from the same deficiencies as ammonia, except that the Permit lacks *even an effort* to explain why a mixing zone for nitrate is denied. In this regard, the District acknowledges that numeric water quality objectives exist for nitrate to protect municipal use. Discharge equal to that objective is unnecessary to protect that use because the use occurs far downstream after considerable dilution. The Permit materials acknowledge as much, but deny a mixing zone for reasons that simply cannot be determined from the Permit or its findings. There is no justification for the effluent limitation.

The Regional Board sought to bolster, or create an alternative basis for, the costly Permit limitations based on a novel and superficial "antidegradation" analysis. The Regional Board signaled out the District for different treatment, performing its own conclusory antidegradation analysis for an already-permitted discharge. This was improper. Further, the Regional Board's analysis did not comply with applicable regulations and State Board guidance. The Regional Board's result-oriented and superficial findings and conclusions are inadequate and unsupported.

The Permit also includes other provisions that unnecessarily put the District at risk of noncompliance for reasons unrelated to appropriate protection of beneficial uses.

The State Board should grant the relief requested by the District for reasons explained herein and in the record.

II. BACKGROUND

A. District Operation

The District owns and operates the SRWTP. The "Background and Facility Description" Findings of the Permit (sections II.A, B) are accurate. Decades ago, the District through the SRWTP, accomplished regionalization of wastewater treatment and disposal, replacing 22 separate treatment plants.[3]

In 2000, the Regional Board adopted Order No. R5-00-188, renewing the waste discharge requirements and NPDES permit (No. CA0077682) for the SRWTP. The District has an exemplary record of compliance with that permit. In addition, the District is a leader in promoting watershed-wide understanding and collaboration in water quality issues, and is an active participant in relevant activities in the region related to water quality planning. The

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[3] Meeting, State of California, Central Valley Regional Water Quality Control Board, Partial Transcript (Dec. 9, 2010), Tiffany C. Kraft, CSR (Hearing Transcript), p. 222:2-3; District's Exhibits presented at December 9, 2010, Hearing (SRCSD Hearing Exhibits), PowerPoint slide 42.

District has realized great success in its source control efforts, including, for example, with respect to mercury.[4]

B. Permit Renewal Process

The District timely filed an application for renewal of the NPDES permit for the SRWTP.[5] Based on then-projected flow increases, the District also requested an increase in permitted discharge, from the existing 181 mgd, average dry weather flow (ADWF), to 218 mgd ADWF. The District submitted "antidegradation" analyses[6] and considerable other technical information based on the requested increase and other issues related to the renewal. However, flow increases did not materialize, and in fact there was a decrease over a period of years. The District ultimately determined it unnecessary to obtain an increase in permitted discharge in connection with this renewal. By letter dated June 11, 2010, the District Engineer withdrew the request for increased permitted discharge,[7] leaving the Regional Board's action to concern only renewal of the already-permitted flow and discharge.

On September 3, 2010, Regional Board staff issued a tentative order for renewal of the SRWTP permit. (California Regional Water Quality Control Board, Central Valley Region, Tentative Order No. R5-2010-XXXX [NPDES No. CA0077682] Waste Discharge Requirements for the Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant (Sept. 3, 2010) (hereafter, September Tentative Permit).) Staff also released a

[4] The predecessor permit included an interim performance-based effluent limitation for total mercury of 5.1 pounds per year. (Order No. R5-00-188, p. 15.) As a result of the District's source control efforts, the actual mercury mass loading from the SRWTP has been lower than that limit, such that the Permit establishes a new, interim performance-based limit of more than 50 percent lower than the previous performance-based limit. (Permit, pp. 15, F-71.) The 2000 permit had also included a provision under which loadings below its annual mass limit would be "banked" for future offset. (Order No. R5-00-188, p. 15.) Approximately 25 pounds was appropriately considered banked under this provision. Unfortunately, the new Permit eliminates the accumulated bank. (Permit, p. F-71; see RWQCB Staff Response to Written Comments for Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant Tentative Waste Discharge Requirements (Staff Response to Comments), pp. 60-61.)

[5] Letter dated February 1, 2005, from Wendell Kido, District Manager, SRCSD, to Ken Landau, Assistant Executive Officer, RWQCB, subject: Application for NPDES Permit Renewal for the Sacramento Regional Wastewater Treatment Plant (SRWTP), NPDES Permit No. CA0077682.

[6] Larry Walker Associates, Antidegradation Analysis for Proposed Wastewater Treatment Plant Discharge Modification (Feb. 2005 and May 20, 2009).

[7] Letter dated June 11, 2010, from Mary Snyder, District Engineer, SRCSD, to Pamela Creedon, Executive Officer, RWQCB re: Request for Change in Permitted Capacity for the Sacramento Regional Wastewater Treatment Plant; see Permit, p. 4.

tentative Time Schedule Order related to certain limitations proposed in the September Tentative Permit. (California Regional Water Quality Control Board, Central Valley Region, Tentative Time Schedule Order No. R5-2010-XXXX Requiring the Sacramento Regional County Sanitation District to Comply with Requirements Prescribed in Order No. R5-2010-XXXX [NPDES Permit No. CA0077682] (Sept. 3, 2010) (September Tentative TSO).) Regional Board staff also released for comments so-called potential permitting options or alternatives, consisting of alternative permitting approaches on certain key issues. These alternatives identified different outcomes than the staff-recommended September Tentative Permit on certain issues. (September 3 Tentative Permitting Options, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant (September Permitting Options).)[8]

The District[9] submitted a letter providing comments and evidence on the September Tentative Permit and September Tentative TSO. (Sacramento Regional County Sanitation District's Comments and Evidence Regarding Tentative NPDES Permit, Time Schedule Order, and Permitting Options Circulated on September 3, 2010 (Oct. 11, 2010) (hereafter, District's October 2010 Comments and Evidence Letter).) The District also supplied documentary evidence. Finally, the District submitted written testimony/comments prepared by nine individuals. Material prepared by these individuals was incorporated into the District's comments.[10] (All of these materials supplement information provided to Regional Board staff prior to the comment period and prior to issuance of the September Tentative Permit.)

On November 24, 2010, Regional Board staff released a revised tentative permit and revised tentative TSO and other materials[11] for consideration by the Regional Board or a Regional

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[8] These documents, and a notice of public hearing, accompanied a letter dated September 3, 2010, from James D. Marshall, P.E., Senior Engineer of Regional Board staff.

[9] Numerous other parties requested, and were ultimately granted, designated party status in accordance with Title 23 of the California Code of Regulations, sections 648(b) and 648.1(a). These parties included numerous agencies who are contractors for water exported from the Delta and an organization representative of contractors (collectively, Water Agencies), the Central Valley Clean Water Association, California Sportfishing Protection Alliance, North State Building Industry Association, and Campbell Soup Company.

[10] See District's October 2010 Comments and Evidence Letter, pp. 146-147.

[11] The documents referenced here are accessible at: www.waterboards.ca.gov/centralvalley/board_decisions/tentative_orders/1012/index.shtml#6 (as of Jan. 10, 2011).

Board panel at a December 9-10 meeting. Relevant here, the materials included: Staff Report, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Proposed NPDES Permit Renewal and Time Schedule Order, Sacramento County (Staff Report); a revised tentative permit reflecting staff's proposal (California Regional Water Quality Control Board, Central Valley Region, Order No. R5-2010-XXXX [NPDES No. CA0077682] Waste Discharge Requirements for the Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Sacramento County (November Tentative Permit)); an "Underline/Strikeout" version of the November Tentative Permit, reflecting changes that had been made to the September Tentative Permit in creating the November Tentative Permit (California Regional Water Quality Control Board, Central Valley Region, Order No. R5-2010-XXXX [NPDES No. CA0077682] Waste Discharge Requirements for the Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Sacramento County (November Redline Tentative Permit))[12]; a revised TSO representing staff's proposal (California Regional Water Quality Control Board, Central Valley Region, Time Schedule Order No. R5-2010-XXXX Requiring the Sacramento Regional County Sanitation District, Sacramento County, to Comply with Requirements Prescribed in Order No. R5-2010-XXXX [NPDES Permit No. CA0077682] (November Tentative TSO)); an "Underline/Strikeout" version of the November Tentative TSO, reflecting changes that had been made to the September Tentative TSO in creating the November Tentative TSO (California Regional Water Quality Control Board, Central Valley Region, Time Schedule Order No. R5-2010-XXXX Requiring the Sacramento Regional County Sanitation District, Sacramento County, to Comply with Requirements Prescribed in Order No. R5-2010-XXXX [NPDES Permit No. CA0077682] (November Redline Tentative TSO)); revised versions of the September

[12] The discussion in this Statement of Points and Authorities includes several citations to the November Redline Tentative Permit. For the State Board's information, the November Redline Tentative Permit includes certain duplicate or triplicate numbering of pages. In some cases, there is also a higher-numbered page preceding a lower-numbered page. In these circumstances, the relevant pages are normally proximate to one another. But in reviewing a citation to the November Redline Tentative Permit it is appropriate to ascertain whether there is more than one page with the cited page number.

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Permitting Options; and Staff Response to Comments (i.e., response to comments received on September Tentative Permit and September Tentative TSO).

On December 8, 2010, Regional Board staff released its proposed "Late Revisions" to the November Tentative Permit.[13]

The 2010 renewal of the Permit occurred ten years after the previous renewal, a period that is longer than typical for NPDES permits in the region. At the same time, the District submits, the renewal was characterized by haste, particularly as related to major issues that are subjects of this Petition. An overriding objective became the adoption of the renewal permit in 2010. The September Tentative Permit and September Tentative TSO provided the first specific indication of staff's recommended action on key issues. There were important oversights, omissions, and inconsistencies in those tentative orders, many identified below and in District comments. The District and others generated and submitted a considerable volume of comments and other material in the five-week comment period ending October 11, 2010.

As discussed above, Regional Board staff issued the revised November Tentative Permit and revised November Tentative TSO and Staff Response to Comments, which were distributed on November 24, 2010. As discussed below, the Staff Response to Comments did not address numerous substantive comments and issues in any way. This concern is not merely technical. The District believes that measured consideration of all comments, and reflection on the issues raised by those comments, is an important part of the process. If time did not allow this, the pace was too hurried. Additionally, significant revisions occurred in the November materials, particularly in regard to areas of greatest concern to the District. For example, there were significant changes made in the Fact Sheet related to proposed tertiary filtration requirements.[14] New rationales were proposed for the denial of mixing zones, including for ammonia and nitrate, and there were substantial revisions in the technical discussion of ammonia-related issues.[15] The

[13] These December 8, 2010, late revisions are also available at the web address cited in footnote 11 for materials released on November 24.

[14] See November Redline Tentative Permit, pp. F-77 to F-78, F-80, F-81, F-77 to F-79.

[15] See November Redline Tentative Permit, pp. F-34 to F-37, F-40 to F-41, F-45 to F-46, J-3, J-6 to J-8.

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September Tentative TSO was revised to include a new time schedule order for chlorpyrifos and diazinon (related to changes in the Tentative Permit regarding the same).[16] Ultimately, this meant that the Regional Board adopted a time schedule order for these constituents on 15-days notice. The District believes it would have been appropriate to re-circulate the November Tentative Permit and November Tentative TSO for comment on the changed provisions, but this did not occur.

The Regional Board conducted a hearing on December 9, 2010, which included testimony of designated parties and statements of many interested persons.[17] As discussed above, Regional Board staff had identified certain permitting alternatives or "options" that the Regional Board could consider (although the staff did not recommend any of these alternatives). The deliberation at the end of the hearing involved no discussion of any of these alternatives; nor did it include a discussion of any of the issues on which the District had presented testimony. The five Board members approved the November Tentative Permit with Late Revisions and certain other revisions recommended by staff at the hearing, as well as the TSO.[18]

III. REQUEST FOR CONSIDERATION OF SUPPLEMENTAL EVIDENCE

A. Scope of the District's Request For Consideration of Supplemental Evidence

In accordance with section 2050.6 of Title 23 of the California Code of Regulations, the District requests that the State Board take official notice of, and consider.[19]

Exhibit C hereto: Memorandum to David Coupe, Senior Staff Counsel, Central Valley Regional Water Quality Control Board, from Paul S. Simmons and Theresa A. Dunham, dated December 9, 2010, re: Sacramento Regional County Sanitation District Comments and Evidence

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[16] See November Redline Tentative Permit, pp. F-71 to F-72; November Redline Tentative TSO, pp. 1-2, 5.

[17] The District understands that statements by interested persons are considered non-evidentiary. (See, e.g., Cal. Code Regs., tit. 23, § 648.1(d).) The District notes, however, that there were certain statements of interested persons that are not accurate. These include, but are by no means limited to, representations concerning the costs for service borne by District customers versus persons in other areas of the state, and concerning analyses of economic impacts to the region.

[18] Hearing Transcript, pp. 462:13-463:9.

[19] To the extent a request is necessary, the District requests the State Board take official notice of the orders of the State Board and Regional Board cited herein, in accordance with section 648.2 of Title 23 of the California Code of Regulations.

Provided to Central Valley Regional Water Quality Control Board (Central Valley Water Board) and Lack of Response to Certain Comments.

B. Support For the Request

The State Board should grant the District's request. Consideration of the document causes no prejudice or unfairness to the Regional Board.

The memorandum provided as Exhibit C was delivered to the Regional Board and parties on December 9, 2010, and the District requested that it be included in the record. The request was denied.[20]

The document in question identified certain deficiencies in the Staff Response to Comments. Federal regulations require that a response to comments "[b]riefly describe and respond to all significant comments on the draft permit . . . raised during the public comment period[.]"[21] The Staff Response to Comments does not comply with this obligation. The attached memorandum does not necessarily identify each and every significant comment to which there was no response. In addition, there are comments discussed below to which there was no response. The District also emphasizes a significant issue identified in the subject memorandum. As discussed, the District submitted written testimony/comments of numerous individuals. The District, in its October 2010 Comments and Evidence Letter, and as reflected on pages 11-12 of Exhibit C, stated:

> We enclose documents completed by numerous individuals identified as testimony or comment (or both). Owing to the limitations on time to respond to the [September] Tentative Permit, the immediately preceding materials do not necessarily include all of the content of each of these individuals' testimony/comment. Accordingly, all of such material is incorporated by reference as part of the District's comments.[22]

The State Board will find that the Staff Response to Comments addresses none of this material.

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[20] Hearing Transcript, pp. 5:19-6:24.

[21] 40 C.F.R. § 124.17(a)(2).

[22] District's October 2010 Comments and Evidence Letter, p. 146.

It appears that the principal reason that Exhibit C was not admitted to the record is that it was delivered only on the morning of the Regional Board hearing.[23] The District acknowledges that it delivered the memorandum at such time. However, this is immaterial. The District did not insist that the Regional Board accept all of the statements in the memorandum as true. Nor did the District insist that the Regional Board not proceed with the hearing. The State Board should also consider that the District and others received a considerable volume of material on November 24, 2010, including a revised tentative permit. As that was the day immediately before Thanksgiving, the date was functionally equivalent to Monday, November 29, 2010, the week immediately preceding the hearing. It is more than understandable that the District was focused on other matters during that week. Finally, the District did not even know there would *be* a Regional Board hearing until December 8, 2010, the day before the hearing.[24]

Further, the District does not ask that the State Board remand the entire matter to the Regional Board simply because of noncompliance with the obligation to respond to comments. The District does, however, believe that the comments all merit consideration as part of the State Board's review.

Finally, if the State Board denies the request, the memorandum at Exhibit C is hereby incorporated by reference as part of this Petition and the Statement of Points and Authorities here provided.

IV. COST CONSIDERATIONS

The Permit references various estimates pertaining to the cost of compliance with Permit provisions. Cost is relevant for several reasons. It is relevant to the Regional Board's overall obligation to act reasonably under Water Code sections 13000 and 13001. Cost is relevant to the Permit requirements for tertiary filtration under Water Code section 13241.[25] It is relevant to

[23] See Hearing Transcript, pp. 5:19-24, 6:3-11.

[24] It was not announced until December 8, 2010, that a sufficient number of Regional Board members would be in office to constitute a quorum. Had there not been a hearing of the Regional Board, Exhibit C would not have been completed by December 9, 2010.

[25] See section V, below.

decisions to grant or deny mixing zones.[26] To the extent State Board Resolution No. 68-16, *Statement of Policy With Respect to Maintaining High Quality Waters in California*, applies, cost and impacts to the community are relevant to that analysis.[27] These examples are not exclusive. Because of the overriding nature of this issue, the cost of compliance is discussed here.

The three largest drivers of Permit compliance cost (setting aside potential liabilities) are ammonia removal (nitrification), nitrate removal (denitrification), and filtration for pathogen reduction and related requirements. The best available estimate of the cost of compliance with these terms is over **$2 billion**. With that said, any estimate of costs referenced in the Permit materials is a staggering number that would have major adverse consequences for individuals and the region.

Steve McDonald and Carollo Engineers (Carollo) provided analysis with respect to foreseeable costs of compliance. Carollo, and Mr. McDonald specifically, have decades of site-specific knowledge and experience with respect to the SRWTP. In addition, they have broad experience with wastewater design, construction, and cost estimation, and Mr. McDonald has been the lead engineer for publicly owned treatment works (POTWs) serving approximately one-third of the population of Northern California.[28]

Carollo prepared various reports and analyses regarding treatment alternatives and costs for the SRWTP, including costs of implementing technologies and compliance with potential permit terms.[29] Among these, and a product that also updated and incorporated results of prior work,[30] was a Technical Memorandum Prepared in March 2009, titled, "Advanced Treatment

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[26] See sections VI, VII, IX, below.

[27] See section VIII, below.

[28] Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal, [Written] Testimony/Comments of Hugh Stephen McDonald, Carollo Engineers on the Costs of Treatment and Feasibility of Complying With Certain Effluent Limitations Proposed in Waste Discharge Requirements for the Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant (McDonald Written Testimony), p. 1 and Exhibit A; Hearing Transcript, p. 168:8-22; SRCSD Hearing Exhibits, PowerPoint slide 4.

[29] McDonald Written Testimony, pp. 1-3; Hearing Transcript, pp. 168:23-169:15.

[30] McDonald Written Testimony, pp. 3-4.

Alternatives for the SRWTP" (2009 Treatment Alternatives Technical Memo).[31] The 2009 Treatment Alternatives Technical Memo evaluated five different treatment "trains" that could be applicable in different scenarios, depending on potential future requirements that could be imposed, and their cost.[32] The 2009 Treatment Alternatives Technical Memo was based on an assumed permitted flow of 218 mgd ADWF. Accordingly, in August 2010 (subsequent to the District's withdrawal of its request for increased permitted flow), Carollo modified the cost estimates to be consistent with a permitted flow of 181 mgd.[33]

The Permit requires full nitrification for ammonia removal, denitrification for nitrate removal, and filtration. The applicable[34] treatment train developed by Carollo is a treatment train involving:

a. Microfiltration and disinfection to meet filtration requirements. The planning level estimate of project costs is $1.2 billion if existing chlorine disinfection is used, and $1.3 billion if ultraviolet disinfection (UV) is used. The planning level estimate of increased operation and maintenance (O&M) costs is $44 million per year (if chlorine is used) and $46 million (if UV is used).[35]

b. Nitrifying trickling filters (NTF) for ammonia removal. The planning level estimated project cost is $580 million, and the increased annual O&M cost is $15 million per year.[36] There is, however, uncertainty as to whether NTFs alone would ensure compliance with the daily maximum effluent limitations for ammonia in the Permit, and thus the cost may be

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[31] This document is included within a larger document in the record titled, "Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant," completed by Larry Walker Associates. (See McDonald Written Testimony, p. 1.)

[32] McDonald Written Testimony, pp. 3-4; Hearing Transcript, p. 169:4-15.

[33] See McDonald Written Testimony, p. 4. The August 19, 2010, project memorandum is titled, "Modification of Flow basis for treatment train costs as previously presented in the 'Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant' " (Carollo, March 2009). It was supplemented by a memorandum of August 25, 2010, titled, "Clarification of base construction costs and construction cost factors as presented in the 'Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant' " (Carollo, March 2009), and other work described in testimony.

[34] Technical analyses are presented in the various reports and testimony.

[35] McDonald Written Testimony, p. 5; Hearing Transcript, p. 172:8-16.

[36] McDonald Written Testimony, p. 5.

greater.[37] Also, the Permit as adopted creates the potential that the District would be required to implement "interim" ammonia reduction.[38] There has been no evaluation of potential added (or stranded) costs associated with meeting revised interim ammonia limits that could arise under the Permit.[39]

c. NTFs followed by Fluidized Bed Reactors (FBR) to meet nitrate limitations. The planning level project cost is $780 million, with increased annual O&M costs of approximately $31 million per year.[40]

The Permit does not make any specific findings related to what the cost of compliance will likely be, whether capital or annual operation and maintenance costs. The Permit and related staff documents do refer to other evaluations that were conducted.[41] Specifically, PG Environmental, a permitting compliance firm engaged by the Regional Board, prepared two memoranda concerning the Carollo work,[42] and a firm retained by the Water Agencies prepared a memorandum and a letter.[43] In general, the differences in all the planning level costs provided for nitrification and denitrification are minor. Indeed, as explained by Mr. McDonald, if put on the

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[37] McDonald Written Testimony, p. 5; Hearing Transcript, pp. 169:25-170:2; [Written] Testimony/Comments of Denny S. Parker Related to Draft Waste Discharge Requirements for the Sacramento Regional Wastewater Treatment Plant Tentative Order of the California Regional Water Quality Control Board, Central Valley Region, September 3, 2010 (Parker Written Testimony), p. 5.

[38] Permit, p. 26.

[39] Hearing Transcript, p. 170:2-3; SRCSD Hearing Exhibits, PowerPoint slide 8.

[40] McDonald Written Testimony, p. 5. Note that these "denitrification" costs also include the nitrification cost for ammonia removal represented by the NTFs. In addition, Mr. McDonald's written testimony states that this technology would not meet proposed nitrate effluent limits. (McDonald Written Testimony, p. 5.) At the time of preparation of the testimony, proposed nitrate limits (in the September Tentative Permit) were extraordinarily low and unprecedented. The proposed limit was revised in the November Tentative Permit and the Permit as adopted, and the identified technology could comply with the Permit limits. (Hearing Transcript, p. 169:20-25.)

[41] Permit, pp. F-79, F-97; Staff Response to Comments, pp. 5-10; Staff Report, pp. 38-40.

[42] Memorandum to Kathleen Harder, Central Valley Regional Water Board, from PG Environmental, LLC, subject: Technical Review of Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant (August 13, 2010); Memorandum to Kathleen Harder, Central Valley Regional Water Board, from PG Environmental, LLC, Subject: Technical Review of Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant (August 18, 2010).

[43] Technical Memorandum, Trussell Technologies, Ammonia Removal Cost Alternatives for the Sacramento Regional Wastewater Treatment Plant (May 31, 2010); Letter to Adam Kear, Senior Deputy General Counsel, Metropolitan Water District of Southern California, from R. Shane Trussell, re: Summary of Preliminary Findings in the Response to the Tentative SRCSD NPDES Permit (Trussell October 1 Letter).

same cost estimating basis as Carollo, the Water Agency's planning level project estimate for nitrification and denitrification is greater than Carollo's.[44]

Somewhat greater differences appear in regard to filtration. In his written testimony and accompanying exhibits, Mr. McDonald addressed in detail the limitations of the PG Environmental work.[45] It is not clear whether Regional Board staff read this material. Among other things, it explains the selection of microfiltration instead of other filtration technology as the appropriate technology choice for the SRWTP at this stage of planning, a choice also made by the Water Agencies' consultant.[46] Mr. McDonald also, again, described the need to put cost estimates on a common, apples-to-apples basis, justified the estimating assumptions used by Carollo, and explained that if put on a common basis, the Water Agencies' project cost for microfiltration would be $722 million as compared to Carollo's $1.25 billion.[47] While differences in these costs are within the accuracy of the "level 5" planning estimates, Mr. McDonald also explained in detail the reasons the Carollo microfiltration estimate was more applicable to the SRWTP.[48]

Mr. McDonald acknowledged, as does the District, that further engineering and pilot testing would be required to refine Carollo's cost estimates, but they are appropriate for master planning.[49] The estimates should have been considered specifically in development of the Permit.[50] As noted previously, no estimate of costs exists that does not represent an extremely large expenditure with real impacts.

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[44] Hearing Transcript, pp. 170:10-174:14.

[45] McDonald Written Testimony, pp. 5-8 and attached Exhibits C and D thereto.

[46] McDonald Written Testimony, pp. 5-8 and attached Exhibits C and D thereto; Hearing Transcript, p. 170:4-8; SRCSD Hearing Exhibits, PowerPoint slide 8.

[47] Hearing Transcript, pp. 170:10-172:16, 177:23-179:11, 181:17-182:9; SRCSD Hearing Exhibits, PowerPoint slides 9-10.

[48] Hearing Transcript, pp. 172:17-174:11.

[49] McDonald Written Testimony, p. 5; Hearing Transcript, pp. 170:6-8, 174:12-14.

[50] As noted above, the Permit does not make specific findings as to the costs to comply with the Permit terms. However, as the District indicated at the Regional Board hearing, the District takes exception to certain discussion of this issue in other documents generated by Regional Board staff, such as the Staff Response to Comments document. These materials purport to provide critical review of certain District or Carollo analyses. Such assertions are not well-informed, ignore completely the content of Mr. McDonald's written testimony, and identify issues that were addressed with Regional Board staff previously. (See, e.g., email memorandum, August 10, 2010, from Vyomini

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The costs of compliance have consequences for individual citizens and the region as a whole. Based on the anticipated costs, the District calculated an increase for the monthly residential charge for wastewater treatment increasing from $20 to $61.50.[51] (These charges exclude separate monthly charges for sewer collection services.) The District calculated a rise in impact fees for households from $7,450 to $35,000.[52] Costs for business will also of course increase similarly.[53]

The Permit and related documents make various, and sometimes internally contradictory arguments, related to the importance of cost. On the one hand, it is stated that "many" communities discharging to surface water pay more, and on the other hand it is stated that other municipalities have implemented technologies that the Permit would require, but pay less.[54] There are numerous problems with this approach and the philosophy it suggests. Most obviously, of course, comparisons are meaningless unless they compare "apples to apples." A simple example discussed above is that customers of the District pay separate charges for treatment and collection. This may or may not be true for others. Also, "many" is a vague statement. However, there are many dischargers in the region (or any given geographic area) not mentioned in the Permit whose customers pay *less*; the District does not suggest that, for that reason, the District's customers should also pay less.

Pandya, to Kathleen Harder, Subject: Questions from review of Cost Benefit Analysis.) In the meantime, the staff materials provide no examination of other cost estimates. Mr. McDonald's written testimony addresses limitations of PG Environmental's memoranda. (See McDonald Written Testimony, pp. 5-8 and Exhibits C and D thereto.) There is no indication this testimony was even reviewed. The District also notes by way of example the very cursory discussion of costs of microfiltration in the Trussell October 1 Letter. (See Trussell October 1 Letter, pp. 3-4.) (The District notes that the Hearing Transcript refers to this letter as referencing "several" projects, but it refers to two. [Hearing Transcript, p. 172:19-22; Trussell October 1 Letter, pp. 3-4; see also SRCSD Hearing Exhibits, PowerPoint slide 11.].)

[51] See Hearing Transcript, p. 223:3-6 and SRCSD Hearing Exhibits, PowerPoint slide 44; see also District's October 2010 Comments and Evidence Letter, pp. 64, 88.

[52] SRCSD Hearing Exhibits, PowerPoint slide 44; see District's October 2010 Comments and Evidence Letter, pp. 64, 88

[53] Hearing Transcript, p. 223:1-6; SRCSD Hearing Exhibits, PowerPoint slide 44; District's October 2010 Comments and Evidence Letter, pp. 64, 88. The specific allocation of costs among existing and new users must of course be approved by the District's Board of Directors based on a rate and fee study. The topic of allocation among classes of customers was discussed at the hearing, but the total costs must be paid by the District's customers in any circumstance.

[54] See, e.g., Permit, p. F-97.

With respect to the comparison to cities such as Lodi, Manteca, Stockton, and Tracy (which the Permit cites as possible reasons ratepayer costs might not equal those calculated by the District), Mr. Dean, the District Engineer, capably addressed the superficiality of such comparisons:

> And I think these comparisons with others are extremely shallow. Our translation of costs to rates and fees is based on a ten-year look ahead and a reasonable financing plan. This is the period that's needed to build major infrastructure.
>
> Many of the numbers sited [sic] for other rates and fees are different for possibly a wide range of reasons. A true comparison must address several other factors. How much of those other plants was actually funded by development when it was in its hay day? Don't know.
>
> How much was funded by grants? Many of the other plants did get grants to help the situations, but we have not done as [sic] analysis of how much grant money was in the comparisons before us today.
>
> How much of the cities do not accurately apportion their costs between wastewater utility and other general funds in the cities? There may be disparities there.
>
> What are the unfunded liabilities with these other utilities? Are they keeping up the infrastructure and doing the maintenance and rehab? Or are some of these folks sitting on giant time bombs with their infrastructure that need to be funded down the road. We don't know. We know this is a huge problem with utilities across the United States.
>
> And we have to talk about the quality and longevity of the projects that were constructed. Until we answer those questions, I find comparison to other utilities a very hollow argument.[55]

More generally, the Permit's ubiquitous theme is that because some other municipal dischargers employ certain treatment technology, the District should too, and the costs will simply be whatever they are. This is entirely inappropriate, and a shirking of the Regional Board's responsibility. It is not the right approach, and not good government.

In fact, the Permit carefully selected certain municipalities and described expensive treatment technologies that have been required of those agencies.[56] There are inaccuracies and misleading statements in some of the information, discussed later. But more fundamentally, the approach to regulation of POTWs has included, and should include, development of water

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[55] Hearing Transcript, pp. 224:4-225:7. The District also notes that the Permit states that other cities have constructed advanced treatment "and have not suffered significant adverse economic impacts as a result of these upgrades." (Permit, p. F-97.) The District is unaware of any analysis or other evidence that would support such a conclusion.

[56] See, e.g., Permit, p. F-96.

quality-based effluent limitations based on the applicable water quality standards and the specific receiving water circumstances.

As the State Board knows, many agencies are dischargers to effluent dominated waters (EDWs) or otherwise where there is limited dilution in the immediate receiving water, and not at all similarly situated to the District. This includes dischargers within the statutory boundaries of the Delta, for example. The Permit is extraordinarily misleading by its failure to address why certain other permits include the requirements that drive the permittees to employ certain treatment technologies. The District believes the technology-based and water quality-based permitting *approach* for the District should be the same as for other dischargers, and applicable standards and the law should guide the outcome. The District does *not* believe the *outcome* must be the same for an ocean discharger as for a discharger to the Delta. Nor does the District believe the *outcome* for the District must be the same as for a given EDW or any other discharger. Applying these principles, the appropriate outcome for the District is consistent with the specific requested actions of the State Board described in paragraph 6 of this Petition above.

The Permit would vastly increase the wastewater utility rates paid by all residents. The Permit's approach to this issue is ultimately cavalier: as long as someone elsewhere pays a given amount, there is no reason the Sacramento region's citizens should not do the same. That residents of some areas pay more than residents of other areas for wastewater utility service is not a reason, above all in these economic times, simply to raise the costs for the Sacramento region. If there is to be a policy to prescribe uniform treatment requirements across the state, or to equalize the cost of wastewater utility service throughout the state (or the cost of other essential public services), that policy should be developed and explained. Failing that, the District should be regulated based on the law, specific circumstances, sound science, and reason.

V. THE PERMIT'S NEW FILTRATION REQUIREMENTS ARE NOT JUSTIFIED

The District objects to, and requests changes to, the Permit's final effluent limitations for total coliform organisms (Permit § IV.A.1.g) and the related final effluent limitations for BOD and TSS (Permit § IV.A.1.a [Table 6]) and "operation" specifications for turbidity (Permit § VI.C.4.a) (all collectively referred to as "filtration" or "tertiary" requirements). The Permit's total coliform requirements (2.2 Most Probable Number [MPN] per 100 mL as a 7-day median, and as otherwise specified in the Permit) are based on Department of Public Health (DPH) "Title 22" regulations that prescribe effluent quality for certain uses of recycled water "that has been transported from the point of treatment or production to the point of use without an intervening discharge to waters of the State."[57] Specifically, under DPH regulations, the "2.2 MPN" requirement applies where effluent is used directly for irrigation of "food crops," impoundments of recycled water for unrestricted recreation, and certain other uses.[58] The new Permit limitations for BOD, TSS, and turbidity are coupled with the new total coliform requirements, and represent limits that can be achieved with filtration technology.[59]

In adopting the filtration requirements in the Permit, the Regional Board: departed from its own precedent; employed an unreasonable standard; made findings that are inconsistent with the Water Code or are completely without evidentiary support (or both); misconstrued or mischaracterized evidence; ignored relevant evidence altogether; and failed to respond to comments submitted by the District.

Order No. 5-00-188, the District's predecessor permit, contained effluent limitations for disinfection/pathogens as follows: 23 MPN/100mL as a median weekly average and 500 MPN/100mL as a daily maximum not to be exceeded in any consecutive two days.[60] Limitations for BOD and TSS in Order No. 5-00-188 were based on applicable requirements of the Clean Water Act (CWA).[61] The previous limits for total coliform, BOD, and TSS are adequate and appropriate. The State Board should determine that the Permit's filtration

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[57] Cal. Code Regs., tit. 22, § 60301.200.

[58] Cal. Code Regs., tit. 22, §§ 60301.220, 60304(a)(1), (b), 60305.

[59] As characterized in the Permit, the new BOD and TSS requirements are "based on tertiary treatment." (Permit, p. F-17.) The turbidity specification is also based on the capabilities of tertiary filtration. (Permit, pp. F-78 to F-79.) All of the described filtration requirements are subject to the Permit Compliance Schedule. (Permit, pp. 30, 33; see also, Staff Report, p. 29, Table 8 [tertiary requirements include BOD, TSS, total coliform, and turbidity].) The Permit generally refers to all of these provisions collectively as "tertiary treatment" or "tertiary filtration."

[60] Order No. 5-00-188, pp. 13-14 and fn. 4.

[61] See Order No. 5-00-188, p. 13. The regulations implementing the CWA require effluent quality for BOD and TSS of 30 mg/L as a 30-day average. (40 C.F.R. § 133.102.) The actual performance of the SRWTP is significantly superior to the CWA "30-30" requirements for BOD and TSS. (See Permit, p. F-6 [Table F-2].)

requirements are improper. The Regional Board staff prepared a "Disinfection Alternative 1" based on 23 MPN/100 mL, with BOD and TSS limits based on CWA requirements.[62] The State Board should order that final effluent limitations for coliform, BOD, and TSS shall be those provided in Disinfection Alternative 1. Those limitations are identified in paragraph 6.B.ii of the District's Petition immediately preceding this Statement of Points and Authorities.

A. The Regional Board Did Not Conduct a Reasonable Potential Analysis

On pages F-72 through F-74, the Permit findings purport to conduct a "reasonable potential" analysis for pathogens based on a water quality objective or "WQO." On page F-78, the Permit includes a heading "WQBEL"; i.e., "water quality-based effluent limitation." In various locations, the Permit characterizes the filtration requirements as WQBELs.[63] However, the Permit is not based on any discernible water quality-based permitting analysis. As described in the Permit itself, the process of establishing WQBELs involves determination of whether the discharge is likely to cause or contribute to exceedances of a numeric or narrative WQO or water quality criterion and, if so, establishing effluent limitations to implement the standard.[64] Nowhere does the Permit identify a WQO or any actual results of a reasonable potential analysis associated with the filtration requirements in the Permit. Instead, the Permit contains only inaccurate and argumentative statements advocating tertiary filtration as a level of treatment.

The applicable Basin Plan WQO for pathogens in the Sacramento River is as follows:

> In waters designated for contact recreation (REC-1), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.[65]

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[62] See Disinfection Alternative No. 1, Sacramento County Sanitation District [sic], Sacramento Regional Wastewater Treatment Plant, Proposed Waste Discharge Requirements and Time Schedule Order (NPDES No. CA0077682); Regional Water Quality Control Board, Central Valley Region Board Meeting – 9 December 2010, Item #6 (document distributed November 24, 2010), p. 3. The interim effluent limitations under the Permit are similar, but not identical to, Disinfection Alternative 1. (See Permit, section IV.A.2.a [Table 7] and section IV.A.2.c.)

[63] See, e.g., Permit, pp. F-77, F-78 to F-79, F-80, F-97.

[64] Permit, pp. 6, F-15; see also *In the Matter of Own Motion Review of Waste Discharge Requirements for the University of California, Davis*, Order No. WQ 2010-0005 (March 16, 2010), pp. 9-10.

[65] *Water Quality Control Plan for the Sacramento River and San Joaquin River Basin*, 4th ed. (Rev. Sept. 2009) (Basin Plan), p. III-3.00.

Section IV.C.3.d.xx(a) of the Permit Fact Sheet[66] purports to address the pathogens "WQO," but does not mention this WQO or *any* WQO at all. The section merely states that the Regional Board desires to require "an equivalent level of treatment" to the level that applies for unrestricted re-use of water.[67] "2.2 MPN," for example, is not a WQO for the Sacramento River. Nor does the Regional Board find that 2.2 MPN is a WQO "reasonably required" to protect beneficial uses of the lower Sacramento River and Delta[68] or a water quality condition "that could reasonably be achieved"[69] in ambient waters. Similarly, the "RPA Results" section related to pathogens[70] does not consider whether the discharge has reasonable potential to cause or contribute to exceedances of a WQO. The "RPA Results" section is only, again, a superficial argument for the level of treatment applicable to certain direct re-use. As discussed above, the DPH regulations prescribe effluent quality for "use of recycled water that has been transported from the point of treatment or production to the point of use *without an intervening discharge to waters of the State*."[71] There is no such use here. Setting aside the lack of direct use, the Permit does not acknowledge that there are other Title 22 reclamation criteria, including 23 MPN per 100 mL, applicable to specific uses.[72] Instead, it implies that the only Title 22 criteria that exist are the requirements for tertiary effluent, which apply to recycled water that comes into direct contact with "food crops" or is impounded for unrestricted recreation.[73] In the instant case, these circumstances are not present or remotely close to present. The reclamation regulations thus have no application or relevance here. In summary, the Permit does not present any analysis to support a WQBEL implementing any discernible WQO.

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[66] Permit, pp. F-72 to F-73.

[67] Permit, p. F-73.

[68] Wat. Code, § 13263(a).

[69] Wat. Code, § 13241(c).

[70] Permit, pp. F-73 to F-78.

[71] Cal. Code Regs., tit. 22, § 60301.200, emphasis added.

[72] See, e.g., Cal. Code Regs., tit. 22, §§ 60304(b) & (d), 60301.225.

[73] Cal. Code Regs., tit. 22, §§ 60304(a)(1), 60305.

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The District, in its October 2010 Comments and Evidence Letter, pointed out the above deficiencies in the pathogens discussion under the headings "WQO," "RPA Results," and "WQBELs."[74] The Staff Response to Comments furnishes no direct response to the District's comments on these issues.

B. The Regional Board Ignored, Then Re-characterized, Its Typical "20:1" Practice in Order to Reach an Outcome

In a letter to the Regional Board dated April 8, 1999, DPH indicated it would consider wastewater discharged to water bodies with identified beneficial uses of irrigation or contact recreation and where the wastewater receives dilution of more than 20:1 to be adequately disinfected if the effluent coliform concentration does not exceed 23 MPN/100 mL as a 7-day median and effluent coliform concentration does not exceed 240 MPN/100 mL more than once in any 30-day period. DPH reiterated this advice in a letter dated July 1, 2003: "A filtered and disinfected effluent should be required in situations where critical beneficial uses (i.e., food crop irrigation or body contact recreation) are made of the receiving waters unless a 20:1 dilution ratio (DR) is available. In these circumstances, a secondary, 23 MPN discharge is acceptable . . . . For wastewater discharges into streams that experience tidal influences an instantaneous DR of less than 20:1 is acceptable as long as the average for each day exceeds 20:1."[75]

Daily dilution of the SRWTP effluent is always greater than 20:1, and ordinarily it is considerably greater. It is not disputed that the average dilution of the SRWTP effluent is over 50:1.[76] Further, had the District been discharging at its *full* permitted flow during the period

[74] District's 2010 October Comments and Evidence Letter, p. 7. The District does not dispute that the Regional Board *can* in appropriate circumstances issue WQBELs, including WQBELs more stringent than necessary to implement an adopted WQO. This requires compliance with Water Code §§ 13263(a) and 13241, a subject discussed below. The September Tentative Permit did not include any discussion of findings under these Water Code provisions.

[75] Letter dated July 1, 2003, to Thomas R. Pinkos, Executive Officer, RWQCB, from David P. Spath, Chief, Division of Drinking Water and Environmental Management.

[76] See Staff Report, p. 30; see also District's October 2010 Comments and Evidence Letter, pp. 8, 12; Permit, p. F-38.

January 1, 1998, through January 1, 2010, there would have been zero days with average dilution less than 20:1.[77]

The Regional Board routinely uses the 20:1 guideline or policy. For example, an NPDES permit issued last year states:

> In a letter to the Regional Water Board dated 8 April 1999, DPH indicated it would consider wastewater discharged to water bodies with identified beneficial uses of irrigation or contact recreation and where the wastewater receives dilution of more than 20:1 to be adequately disinfected if the effluent coliform concentration does not exceed 23 MPN/100 mL as a 7-day median and if the effluent coliform concentration does not exceed 240 MPN/100 mL more than once in any 30 day period. In a subsequent letter dated 1 July 2003, DPH states that a "filtered and disinfected effluent should be required in situations where critical beneficial uses (i.e. food crop irrigation or body contact recreation) are made of the receiving waters unless a 20:1 dilution ratio is available. In these circumstances, a secondary, 23 MPN discharge is acceptable." DPH considers such discharges to be essentially pathogen-free.[78]

The September Tentative Permit did not even refer to the 20:1 dilution ratio guideline. To the District's knowledge, the lack of reference to t his guideline is unprecedented in at least the last decade. In its comments on the September Tentative Permit, the District identified this unequal treatment. The District also stated, and reiterates here:

> The Regional Board has conformed its permitting practice to the 20:1 guideline.· The District has reviewed 56 recent Region 5 permits, including 22 from 2007, 19 from 2008, 10 from 2009, and 5 from 2010. A list of the reviewed permits is enclosed. Thirty-three permits found less than 20:1 dilution, and 18 found more than 20:1 dilution. Of the permits allowing less than 20:1 dilution, all contained total coliform effluent limits of 2.2 MPN/100 mL as a 7-day median. Of the 18 allowing more than 20:1 dilution, 16 contained total coliform effluent limits of 23 MPN/100 mL as a 7-day median (or higher). Two contained total coliform effluent limits of 2.2 MPN/100 mL as a 7-day median. In other words, 16 of 18 permits issued to similarly situated dischargers in the 2007-2010 period *did not* include the limits imposed here for coliform and related constituents.[79]

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[77] District's October 2010 Comments and Evidence Letter, p. 12. Certain other material in the record that refers to the probability of occurrence of less than 20:1 dilution is based on calculations assuming the once-requested, increased permitted flow of 218 mgd ADWF. The value cited above is based on 181 mgd ADWF.

[78] Order No. R5-2010-0019 (City of Chico), pp. F-27 to F-28.

· While the District believes the guideline or policy may be unnecessarily conservative and there are rulemaking considerations associated with the guideline, the present point is that the Permit is inconsistent with historic practice.

[79] A table summarizing this review was provided with the District's October 2010 Comments and Evidence Letter and is titled "List of Reviewed Region 5 Permits: Tertiary Coliform Limits and Available Dilution."

The two exceptions involved different circumstances. The two permits imposing tertiary limits even though 20:1 dilution was available were for the City of Angels Wastewater Treatment Plant, Order No. R5-2007-0031 (NPDES No. CA0085201), and the Ironhouse Sanitary District Wastewater Treatment Plant, Order No. R5-2008-0057 (NPDES No. CA0085260). Importantly, in both of these instances, the publicly owned treatment works (POTW) itself was proposing to discharge Title 22 tertiary effluent. The City of Angels permit reflects that the City's own mitigated negative declaration required treatment equivalent to Title 22 tertiary. The Ironhouse Sanitary District's own Environmental Impact Report and antidegradation analysis for a new discharge were based on a Title 22 tertiary treatment facility.[80]

The Permit and related materials frequently refer to "large" dischargers in the Delta who have been required to install filtration, as an argument for the Permit filtration requirements.[81] In each of those cases, however, the receiving water was found not to provide 20:1 dilution of those discharges.[82] Those examples are irrelevant for that reason alone.

The revised November Tentative Permit and Permit as adopted, do at least acknowledge the 20:1 policy, characterizing it as a "rule of thumb" and not a regulation.[83] While the District agrees that the policy is not a regulation, the Permit improperly seeks to create distance between normal practice and this Permit.[84] In particular, the Permit selectively identifies POTW discharges to the Sacramento River downstream of Shasta Dam where dilution is much greater

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[80] District's October 2010 Comments and Evidence Letter, pp. 12-13, fn. * in original.

[81] Permit, p. F-9; see Staff Report, p. 40; Staff Response to Comments, pp. 5, 40.

[82] See Order No. R5-2008-0154 (City of Stockton), pp. 31, F-38 to F-39; Order No. R5-2007-0113 (City of Lodi), pp. 34, F-32 to F-33; Order No. R5-2009-0095 (City of Manteca), pp. 32, F-46 to F-47; Order No. R5-2007-0036 (City of Tracy), pp. 24, F-24, F-39 to F-40.

[83] See November Redline Tentative Permit, pp. F-77 to F-78; Permit, p. F-74.

[84] As discussed above, the District demonstrated that in 16 of 18 situations over a period in 2007-2010, the Regional Board did not require filtration where 20:1 dilution exists, and in the remaining 2 cases the dischargers proposed, and did not object to, filtration. Regional Board staff went back further in time, to 2005, and the Staff Report states that there is a grand total of two more situations where 20:1 dilution exists and the permit for the discharger provides for filtration. (Staff Report, p. 24.) Tellingly, there is no accounting provided related to the permits over the larger time period that do *not* require filtration. Moreover, the two other permits identified in the Staff Report do not appear to present analogous situations. The permit for the Bear Valley Wastewater Treatment Facility authorizes discharges to Bloods Creek and the Bear Valley Wastewater Storage Reservoir. (Order No. R5-2005-0139 (Bear Valley), pp. 1-2.) Discharge of effluent of 23 MPN may occur when the effluent receives 20:1 dilution and it is necessary to maintain design conditions in the reservoir. (Order No. R5-2005-0139, pp. 3, 16, 21.) Wastewater discharged to the *reservoir* is required to have tertiary treatment because discharges to an unnamed tributary of Bloods Creek "may occur with little or no dilution." (Resolution No. R5-2008-0141, p. 1, amending Order No. R5-2005-0139.) The City of Jackson permit reflects specific use of minimally diluted water in a trailer residential park drawing from the receiving stream and a lake downstream of the discharge. (Order No. R5-2007-0133 (City of Jackson), p. F-6.) Either of these permits may be more conservative than necessary, apparently were not challenged, and are not analogous in any event.

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than 20:1, suggesting the real threshold is not 20:1 but some other, unstated value.[85] It is unsurprising that certain discharges to the Sacramento River downstream of Shasta Dam have very high levels of dilution. This does not mean that the policy is something *other* than 20:1 for the Sacramento River or anywhere else the policy applies. Indeed, there are examples of the Regional Board finding much lower levels of dilution than the selected examples now cited in the Permit, yet still not requiring filtration where 20:1 dilution exists.[86] In other words, "20:1" means 20:1, not some other number in terms of the dilution threshold employed by the Regional Board.

Ultimately, the Regional Board's only justification offered for deviating from normal practice revolves around an inaccurate and incomplete discussion of risk associated with the SRWTP discharge and failure to consider evidence or statutory requirements, addressed further below.

C. The Permit Mischaracterizes the Risk Assessment and Ignores Relevant Evidence Altogether

1. February 2010 Risk Assessment Report

While the 20:1 dilution policy remains highly relevant, it is correct that Regional Board staff also sought a recommendation from DPH with regard to disinfection.[87] Because

[85] See November Redline Tentative Permit, p. F-78; Permit, p. F-74.

[86] For recent examples, see, e.g., Order Nos. R5-2010-0073 (Sewerage Commission-Oroville); R5-2010-0019 (City of Chico); R5-2009-0078 (Chester Public Utility District); R5-2009-0007 (San Andreas Sanitary District); R5-2008-0179 (Town of Discovery Bay CSD); R5-2008-0162 (Tuolumne Utilities District); R5-2007-0134 (City of Yuba City); R5-2007-0098 (Tehama CSD #1); R5-2007-0069 (El Dorado Irrigation District); R5-2007-0056 (City of Mount Shasta). These specific examples and dilution levels recognized or allowed for each are also reflected in PowerPoint slide 29 of SRCSD's Hearing Exhibits. By way of closing statement, Regional Board staff stated that dilution "granted" in some permits may be less than what exists in the receiving water, but also, "I'm absolutely not saying that there aren't permits that are not right around 20:1." (Hearing Transcript, pp. 432:25-433:1.)

[87] The revised November Tentative Permit, released after receipt of the District's October 2010 Comments and Evidence Letter, states that Regional Board staff sought a DPH recommendation "rather than" rely upon the 20:1 policy. (See November Redline Tentative Permit, p. F-78; Permit, p. F-75.) The District would characterize the request as more akin to an adjunct to the 20:1 policy that ultimately served to confirm the lack of need for filtration. (See also Letter dated June 9, 2009, to Ken Landau, RWQCB, from Robert Seyfried, SRCSD, re: Comments on Letter to Carl Lischeske (May 11, 2009) Requesting a Health Risk Assessment for Sacramento Regional Water Treatment Plant Discharge to the Sacramento River.) The Permit also states that Regional Board staff "requested guidance" from DPH related to certain research by Dr. Robert Emerick. (Permit, p. F-75.) DPH provided no such guidance. However, in comments on the September Tentative Permit relating to this issue, the District explained:

> The reference within the Tentative Permit on pages F-73 and F-74 [of the September Tentative Permit] to Dr. Robert Emerick's study on UV disinfection of wastewater particles is not relevant to the discussion of relative risks to contact recreation due to protozoan pathogens. The Tentative

Cryptosporidium and *Giardia* are less susceptible to inactivation by chlorine than coliform, subsequent inquiry focused on the risk of illness from these organisms based on ingestion of river water. DPH staff initiated a preliminary evaluation, but it was agreed that there were significant problems and uncertainties with that work.[88] DPH and Regional Board staff then endorsed the recommendation that an expert risk evaluation be conducted by Dr. Charles Gerba. Dr. Gerba is a Professor of Environmental Microbiology at the University of Arizona, and a renowned expert on microbial risk assessment. Among other things, he has produced over 500 articles, including textbooks, in environmental science and risk assessment. He has served as an advisor to multiple federal and state agencies, and conducts research on microbial fate and transport in the environment and wastewater treatment.[89] With interaction and input by Regional Board staff and DPH, Dr. Gerba prepared a draft report and then a report dated February 23, 2010.[90] Dr. Gerba also subsequently submitted written testimony in October of 2010, and testified and presented evidence at the Regional Board hearing.[91] None of Dr. Gerba's work or testimony has been disputed.

Dr. Gerba performed a quantitative microbial risk assessment to determine the risk of acquiring gastrointestinal illness from *Giardia* and *Cryptosporidium* via ingestion of river water.

> Permit states that, '[C]entral Valley Water Board staff requested guidance on whether Dr. Emerick's research that the Discharger's effluent had high (20) percent of coliform associated particles could be underestimating the pathogenic risk of the discharge.' The focus of the study was on UV disinfection of particle-associated coliform bacteria. The researchers collected effluent samples prior to disinfection from several locations in California, including SRWTP. One component of the study was to analyze the fraction of wastewater particles that harbored coliform bacteria—the result to which the Tentative Permit refers. The study included no speculation of the pathogenic risk associated with any treatment plant, let alone one using chlorine disinfection, based on the particle-association results. (District's October 2010 Comments and Evidence Letter, p. 9.)

Staff Response to Comments provides no response to the District's accurate comment on this point.

[88] See, e.g., Letter dated August 23, 2010, to Ken Landau, RWQCB, from Stan Dean, SRCSD, re: Review of Department of Public Health Records Pertaining to SRCSD NPDES Permit Renewal Recommendation, p. 1.

[89] See [Written] Testimony/Comments of Charles P. Gerba, Ph.D., Related to Draft NPDES Permit for the Sacramento Regional Wastewater Treatment Plant, submitted on October 11, 2010 (Gerba Written Testimony), p. 1 and Attachments to Gerba Written Testimony; SRCSD Hearing Exhibits, PowerPoint slide 30.

[90] *Estimated Risk of Illness from Swimming in the Sacramento River*, Report for Sacramento Regional County Sanitation District (SRCSD), Charles P. Gerba, Ph.D. (Feb. 23, 2010) (February 2010 Risk Assessment Report).

[91] Gerba Written Testimony, pp. 1-5; Hearing Transcript, pp. 208:14-221:20; SRCSD Hearing Exhibits, PowerPoint slides 31-40.

The analysis relied upon standard microbial risk assessment methods.[92] The analysis calculated risks of illness based on compiled ambient water quality data from four locations: Veteran's Bridge, which is 8 miles upstream of the SRWTP discharge; Freeport (sometimes referred to as "Freeport Marina"), which is immediately upstream of the discharge; Cliff's Marina, which is approximately 0.5 miles downstream of the discharge; and River Mile 44, which is approximately 1.5 miles downstream of the discharge. It also calculated risk of a 20:1 blend of upstream river water and effluent, a condition hypothetically assumed to exist at all times in the assessment.[93]

The report compared these risks to acceptable risk levels identified by U.S. EPA in U.S. EPA's "Ambient Water Quality Criteria."[94] This U.S. EPA acceptable risk level is 8 illnesses per 1000 bathers/swimmers.[95] The report also notes that in the case of recreational waters, risk of illness is used rather than risk of infection. Forty to fifty percent of persons infected actually experience gastrointestinal illness.[96]

For purposes of the February 2010 Risk Assessment Report, very conservative, and conservatively compounding, assumptions were employed. For example, the February 2010 Risk Assessment Report used a conservative assumption with respect to the viability of *Giardia* cysts in SRWTP effluent. Not all the cysts or oocysts in measured water are viable (capable of causing an infection).[97] While no data exist on the percentage of *Giardia* cysts in secondary-treated wastewater that are viable, such data do exist for *Cryptosporidium* oocysts. This percentage

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[92] Gerba Written Testimony, p. 1.

[93] February 2010 Risk Assessment Report, pp. 3-5; Hearing Transcript, pp. 211:12-18, 213:21-214:1; SRCSD Hearing Exhibits, PowerPoint slides 37-39. As water moves further downstream, potential impacts attributable to the SRWTP discharge diminish. (See, e.g., Gerba Written Testimony, p. 3.) The February 2010 Risk Assessment Report, on page 5, relates certain data on the frequency of occurrence of dilution of 20:1. These frequencies are based on an assumed permitted 218 mgd ADWF rather than 181 mgd. The report was prepared before the District decided to withdraw its request for an increase to 218 mgd as permitted flow.

[94] *Ambient Water Quality Criteria for Bacteria – 1986* (U.S. EPA, Jan. 1986, EPA440/5-84-002) (U.S. EPA Recreation Criteria Document).

[95] U.S. EPA Recreation Criteria Document, p. 9; Hearing Transcript, p. 210:21-25. As was pointed out by DPH, the February 2010 Risk Assessment Report inadvertently cited a 19 per 1000 swimmers threshold that applies to salt water rather than the 8 per 1000 acceptable risk that is applicable to freshwater recreation. The oversight is not material.

[96] February 2010 Risk Assessment Report, p. 9; Hearing Transcript, p. 209:5-7.

[97] February 2010 Risk Assessment Report, p. 7; Hearing Transcript, p. 212:6-12.

value was used for *Cryptosporidium*, but it was also simply, and very conservatively, assumed in the February Report that an equal percentage of *Giardia* cysts from the SRWTP were viable.[98]

In addition, although the U.S. EPA acceptable or recommended risk levels are based on one swimming or bathing exposure (also referred to as swimming activity day), the February 2010 Risk Assessment Report calculates risk from both one day of swimming activity and ten days of swimming activity.[99]

Also, the February 2010 Risk Assessment Report assumed that each individual swallows 100 mL of water during a day of swimming activity. This is *two to sixteen times greater* than amounts typically used in such risk assessments. U.S. EPA studies indicate that *37 mL* is a more appropriate value for a day of swimming. Nonetheless, the 100 mL assumption was applied throughout, unquestionably representing another very conservative assumption.[100]

The resultant risk calculations are generally reflected in Tables 3-5 of the February 2010 Risk Assessment Report. Thus, for example, referencing Table 4 and using the applicable conservative assumptions, the calculated average risk of illness from ingesting *Cryptosporidium* for a swimmer at Veteran's Bridge is 1.20×10^{-5} (or, 1.2 in 100,000), and at River Mile 44 it is 1.27×10^{-5} (or, 1.27 in 100,000).

The February 2010 Risk Assessment Report found that for all scenarios evaluated, even combining risks from the two protozoa under the suite of conservative assumptions, the risk was below the U.S. EPA recreational criteria accepted risk value by two to three orders of magnitude.[101]

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[98] February 2010 Risk Assessment Report, p. 7; Gerba Written Testimony, p. 3; Hearing Transcript, p. 212:15-18.

[99] Gerba Written Testimony, p. 2; Hearing Transcript, p. 212:18-19; SRCSD Hearing Exhibits, PowerPoint slide 34.

[100] February 2010 Risk Assessment Report, p. 8; Gerba Written Testimony, p. 2; Hearing Transcript, pp. 212:20-213:2.

[101] February 2010 Risk Assessment Report, p. 10; Hearing Transcript, p. 211:18-20; SRCSD Hearing Exhibits, PowerPoint slide 33.

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2. Letter From DPH and Response

DPH wrote to Regional Board staff on June 15, 2010, after review of the February 2010 Risk Assessment Report.[102] DPH pointed out (not specifically referencing, but presumably using, Table 5 on p. 16 of the February 2010 Risk Assessment Report) that the calculated risk of illness reflected for swimmers was on average 1.3 per 10,000 at Veteran's Bridge (upstream), 1.2 per 10,000 at Freeport (upstream), 1.8 per 10,000 at Cliff's Marina (.5 mile downstream), and 3.4 per 10,000 at River Mile 44 (1.5 miles downstream).[103] The "bottom line" recommendation in the DPH letter was that SRCSD's effluent not cause an additional risk of infection greater than 1 in 10,000.[104]

In a letter of June 30, 2010, the District responded to the DPH letter, noting the extremely conservative nature of the DPH recommendation, the high cost of filtration, and the fact that the February 2010 Risk Assessment Report used extremely conservative assumptions. The District also pointed out that even with all the conservative assumptions, the difference at .5 miles downstream was not statistically significant, and while the difference at 1.5 miles downstream was statistically significant, the value may be influenced by different factors such as the marina or other inflows. In addition, there were certain misstatements in the DPH letter that required clarification or correction. The District also noted that, even though the risk level recommendation proposed by DPH was extremely conservative, the level could be met if just one of the conservative assumptions were more realistic.[105] In written testimony subsequently submitted in October, Dr. Gerba explicitly agreed with the District's communications in this

[102] Letter dated June 15, 2010, to Kenneth D. Landau, RWQCB, from Gary H. Yamamoto, P.E., DPH, re: Request for Health Risk Assessment for Sacramento Regional County Sanitation District (SRCSD) Discharge to Sacramento River, Sacramento County (DPH June 2010 Letter).

[103] DPH June 2010 Letter, p. 2.

[104] DPH June 2010 Letter, p. 3.

[105] See Letter dated June 30, 2010, to Ken Landau, RWQCB, from Stan Dean, SRCSD, Subject: California Department of Public Health letter dated June 15, 2010 (District's June 2010 Letter), pp. 2-4; see also Letter dated August 23, 2010, to Ken Landau, RWQCB, from Stan Dean, SRCSD, Subject: Review of Department of Public Health Records Pertaining to SRCSD NPDES Permit Renewal Recommendation. The District notes that in the cited June 30, 2010, letter (p. 3) there is discussion of the frequency of occurrence of 20:1 dilution, but this is based on assumed permitted flow of 218 mgd rather than 181 mgd.

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regard as related to the microbial risk analysis, in addition to addressing additional topics discussed below.[106]

3. Permit Discussion of February Report

The Permit contains severe mischaracterizations or misunderstandings regarding the February 2010 Risk Assessment Report. Further, the Permit *does not address at all* Dr. Gerba's written testimony or testimony at the hearing. Nor has anyone disputed Dr. Gerba's analysis or testimony, a fact that undercuts much of the discussion in the Permit. The District addresses, immediately below, the Permit findings and related material that pertain only to the February 2010 Risk Assessment Report. Thereafter, in section V.C.4 below, the District discusses Dr. Gerba's subsequent testimony and the Regional Board's failure to consider that evidence at all.

The revised November Tentative Permit and the adopted Permit contain discussion that requires attention related to both the acceptable risk level identified by U.S. EPA (which the Permit refers to as the "Beach Standard") and the February 2010 Risk Assessment Report.[107] With respect to the U.S. EPA risk level, the Permit states that this level is not applicable for discharge of treated sewage or a "policy" of U.S. EPA.[108] The District submits that these statements are incorrect and misleading. In fact, the U.S. EPA acceptable risk level was developed with specific attention to waters affected by wastewater discharge.[109] The U.S. EPA freshwater recreational criteria are values developed to assist states in the development of bathing standards, and the criteria are intended to represent an acceptable rate of illness.[110]

[106] Gerba Written Testimony, p. 2.

[107] November Redline Tentative Permit, p. F-80; Permit, pp. F-76 to F-77.

[108] November Redline Tentative Permit, p. F-80; Permit, p. F-76.

[109] See Gerba Written Testimony, p. 2 ("The USEPA 1986 standards apply to all surface recreational waters regardless if they are directly influenced by treated wastewater or not."); U.S. EPA Recreation Criteria Document, p. 3 (U.S. EPA criteria based on studies whose goals included "to determine if swimming in sewage-contaminated water carries a health risk for bathers"); U.S. EPA Recreation Criteria Document, p. 5 ("[T]he association of illness in swimmers using bathing water contaminated by treated sewage is an important aspect of the process for developing recreational water quality criteria[.]"). With these considerations, the studies went on to establish a quantitative relationship between gastroenteritis and indicator bacteria concentrations.

[110] The U.S. EPA Recreation Criteria Document (p. 6) contains a section titled "Basis of Criteria for Marine and Fresh Recreational Waters" which defines "recreational water quality criterion" and notes that, from such a definition, "a criterion now can be adopted by a regulatory agency, which establishes upper limits for densities of

The risk levels from the U.S. EPA Recreation Criteria Document have been used in recent U.S. EPA regulations adopting *regulatory* criteria for various states. In 2000, Congress passed the Beaches Environmental Assessment and Coastal Health Act of 2000 (Pub.L. No. 106-284 (Oct. 10, 2000) 114 Stat. 870) (BEACH Act) which required states to adopt either the U.S. EPA 1986 Criteria or criteria "as protective" as the U.S. EPA recommendation. The U.S. EPA's 2004 Water Quality Standards for Coastal and Great Lakes Recreation Waters promulgated water quality criteria for the remaining states that had not yet adopted protective criteria, putting in place regulatory criteria corresponding to an illness rate of 0.8% for swimmers (the U.S. EPA criteria value) in freshwater.[111]

The revised November Tentative Permit and the adopted Permit contain confusing statements or findings related to what would occur "if" a water is at the U.S. EPA acceptable risk level, including a statement that: "If the Beach Standard is applied to the SRCSD discharge, under the most critical river conditions," the discharge would cause nearly 1 in 100 recreaters to become ill.[112] While there is no reference in this passage of the Permit to any data, the statement is at best inaccurate and misleading. First, the statement confuses the risk threshold with the conditions that actually exist in the Sacramento River. Including any effect of the SRWTP with current disinfection levels, the risk levels are orders of magnitude less than the U.S. EPA acceptable risk level. The District has *not* contended that the U.S. EPA recommended risk level should be the water quality objective or that the SRWTP disinfection requirements should be changed to allow discharge that would precisely result in this risk level in the Sacramento River; the District has consistently pointed out that under all conditions, the actual risks in the river are dramatically

indicator bacteria in waters that are associated with acceptable health risks for swimmers." Further on in the document, it is stated that U.S. EPA's evaluation of bacteriological data indicated that using their recommended indicator levels would cause an estimated 8 illnesses per 1000 swimmers at freshwater beaches. (U.S. EPA Recreation Criteria Document, p. 9.) The document notes that those relationships are approximate, but states: "However, these are EPA's best estimates of the accepted illness rates for areas which apply to EPA fecal coliform criterion." (U.S. EPA Recreation Criteria Document, p. 9.)

[111] 69 Fed. Reg. 67218-67243, 67232 (Nov. 16, 2004) (codified at 40 C.F.R. § 131.41) ("EPA is promulgating water quality criteria that correspond to an illness rate of 0.8% for swimmers in freshwater[.]").

[112] November Redline Tentative Permit, p. F-80; Permit, p. F-77.

lower than the acceptable risk level used by U.S. EPA and many states.[113] The risk associated with the SRCSD discharge is simply not what is suggested by the finding.[114]

The Permit contains essentially no discussion of any actual risk associated with the discharge other than a statement, unsupported by any data, that "at times" the risk "nearly quadruples" downstream of the discharge as compared to upstream.[115] Materials external to the Permit, including the Staff Report, include a statement that the February 2010 Risk Assessment Report "concluded" that, with conservative assumptions, there is an increased risk of illness of downstream water recreationists from *Giardia* and *Cryptosporidium* of 1.6 to 3.7 times.[116] Such statements or findings are not conclusions of the February 2010 Risk Assessment Report. They may have been derived from tables in the report, although it is not clear who calculated the figures or how. Beyond that, at minimum, they do not appear to account for the inherent variability in pathogen data and associated risk calculations, and there is no recognition of the small absolute risk calculated for any scenario (e.g., a theoretical doubling or quadrupling of a near-zero risk still results in a near-zero risk). Nor do the findings take into consideration other evidence or points discussed herein.

Regional Board staff presentation at the hearing cited a "1.5 to 3.7" increase in risk and referred to a "doubling" of risk, from one unidentified value to another unidentified value.[117] Staff also referred to extreme and non-representative conditions not even analyzed in the February 2010 Risk Assessment Report and for which there is thus no technical analysis. These characterizations suffer from the same deficiencies noted above, including the failure to consider

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[113] The referenced statement in the Permit is confusing, given that the U.S. EPA recreation criteria are based on a linkage of gastroenteritis and swimming in wastewater-influenced waters, and subsequent determination of an indicator bacteria concentration which will be protective of human health. The criteria are based on a risk of illness which combines wastewater influence with natural bacteria sources. There is no support in the U.S. EPA Recreation Criteria Document for the claim that treated effluent would raise the risk of receiving water which meets the U.S. EPA criteria – the acceptable risk level already accounts for all pathogen sources contributing to risk in the water. (U.S. EPA Recreation Criteria Document, p. 9.)

[114] See also discussion in section V.C.4.

[115] Permit, p. F-95.

[116] See Staff Report, pp. 24-25.

[117] Hearing Transcript, p. 94:3-20.

overall risk and the low absolute values under any scenario. In addition, however, it was later disclosed that the Regional Board staff hearing testimony was based on the *wrong data*.[118] Thus, the testimony does not have utility. (The District is uncertain whether the Permit findings or Permit-related documents referenced above may also have been based on the wrong data.)

The Permit does not meaningfully consider the exceptionally small risks, or that they were the product of very conservative assumptions.[119] Moreover, as discussed below, the Permit does not consider in any way Dr. Gerba's uncontroverted testimony and analysis concerning inactivation of *Giardia* through the SRWTP treatment processes.[120]

4. Additional Evidence Entirely Ignored in the Permit

In addition to other comments and evidence submitted concerning the September Tentative Permit, in October, the District transmitted written testimony of Dr. Gerba.[121] In his written testimony and testimony at the Regional Board hearing, Dr. Gerba described the preparation and outcomes of the February 2010 Risk Assessment Report. He expressed his

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[118] Mr. Landau, Regional Board Assistant Executive Officer: "In closing, filtration. First, there was a discrepancy in the data I was putting on Power Point slides versus the districts. That was my mistake. I had actually grabbed an earlier version of the report. The parasite data is the same, but the health risks numbers were somewhat different." (Hearing Transcript, pp. 431:21-432:1.) The discrepancy in data referred to by Mr. Landau was the subject of a brief interruption of Dr. Gerba's hearing testimony that was ultimately resolved by confirmation that the data Dr. Gerba was describing were in fact in the record. (Hearing Transcript, pp. 218:3-219:8.)

[119] For example, the District's June 2010 Letter (p. 4) included the observations that reasonable assumptions "would result in a projected risk of infection of less than 1 in 10,000 in the Sacramento River downstream from the SRWTP discharge." The District strongly takes issue with the Staff Report's discussion of this reality. Specifically, the Staff Report appears to insist that all assumptions be treated as District-created true facts, and that the District should not treat the February 2010 Risk Assessment Report as "wrong." (Staff Report, pp. 28-29.) The District does not assert that the assessment was wrong. Rather, the District asserts that the February 2010 Risk Assessment Report supports that, even with the most conservative assumptions, there is no meaningful change in risk associated with the SRWTP discharge, and that no further analysis should have been needed. However, it is hardly wrong to examine the reasonableness of assumptions if the consequences of failing to do so are extreme.

In this regard, the September Tentative Permit (p. F-75) recognized realities and included a statement that "it is possible that further refinement of the Discharger's health risk assessment would demonstrate that the Discharger already achieves the health risk recommended by DPH." It is extremely troubling that this passage was *deleted* after receipt of all the District's materials submitted in October, rather than evidence being *considered*. (See November Redline Tentative Permit, p. F-80.)

[120] Section V.C.4, *infra*.

[121] Gerba Written Testimony; Hearing Transcript, p. 208:14-18.

conclusion that the "SRWTP discharge does not result in a meaningful increase in risk to recreationists of waterborne disease."[122]

In addition, Dr. Gerba explained that, since completion of the February 2010 Risk Assessment Report, he had also considered the effect of current SRWTP disinfection practices on the viability of *Giardia* cysts: "The impact of chlorination on the discharge from the [SRWTP] was not considered in the [February 2010 Risk Assessment Report's] assessment of *Giardia* viability. *Giardia is much more susceptible to inactivation by free chlorine and chloramines than Cryptosporidium*[.]"[123]

As described below, Dr. Gerba went on, in his October written testimony, to discuss *Giardia* inactivation by the chloramines that are formed in the disinfection process.[124] Preliminarily, however, it requires emphasis that this information is uncontroverted in the record, and the Regional Board ignored it entirely. In this regard, the District's comment letter submitted in October simultaneously with Dr. Gerba's Written Testimony stated:

> However, *Giardia* is much more susceptible to inactivation by free chlorine and chloramines than *Cryptosporidium* and therefore would experience greater inactivation by chloramines in the SRWTP effluent before discharge . . . . Dr. Gerba provides further analysis and conclusions in accompanying material [i.e., the written testimony], which constitutes additional comment and evidence.[125]

The Staff Response to Comments *does not respond* to this comment at all. This is significant because, alone, consideration of inactivation of *Giardia* result in risk values associated with the SRWTP being lower still than under the assumptions of the February 2010 Risk Assessment Report.

Dr. Gerba's analysis, as described in his testimony, leads to the conclusion that in assessing in-river risks, the risk of illness from *Giardia* associated with the discharge is essentially eliminated, and the proper focus in assessing discharge-related risk is thus

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[122] Gerba Written Testimony, p. 5; see Hearing Transcript, p. 215:14-19.

[123] Gerba Written Testimony, p. 3, emphasis added; see also Hearing Transcript, p. 215:14-19; SRCSD Hearing Exhibits, PowerPoint slide 40.

[124] Gerba Written Testimony, pp. 3-5.

[125] District's October 2010 Comments and Evidence Letter, p. 11, citation omitted.

Cryptosporidium.[126] Dr. Gerba explained that chloramines are formed as a result of chlorine use in the disinfection process. He analyzed *Giardia* inactivation from chlorine/chloramines based on U.S. EPA guidance as a function of contact time and temperature of the SRWTP effluent. He confirmed that there are no in-river risks from *Giardia* attributable to the effluent. Accordingly, *Cryptosporidium*, not *Giardia*, is the appropriate microbe to consider in evaluating SRWTP's risks to recreaters from ingestion of river water.[127]

The data related to in-river risk from *Cryptosporidium* are in Table 4 of the February 2010 Risk Assessment Report, and are depicted on PowerPoint slides 38 and 39 of SRCSD's Hearing Exhibits. The calculated risks for a swimming day are:

Veteran's Bridge:	1.2:100,000
Freeport:	1.04:100,000
Cliff's Marina:	1.09:100,000
River Mile 44:	1.27:100,000

Even assuming for the sake of argument that the differences are statistically significant, they are trivial, and for each location the risk of illness is approximately *1:100,000*.

5. Summary of Evidence

The District does not concur that the DPH "recommendation" is an appropriate basis for regulation. First, it advocates extremely costly treatment based on a risk value or change in risk that is unduly low. Indeed, the value is based on drinking water standards, not recreation.[128] Second, the value is not based on consideration of ambient water quality conditions or the relative significance or insignificance of any change in water quality that may be caused by the SRWTP. In other words, it is disconnected from development of WQBELs related to ambient WQOs. Third, DPH does not consider the factors provided in Water Code sections 13263(a) and 13241, which the Regional Board must do.[129]

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[126] Hearing Transcript, pp. 213:16-19, 215:14-16, 221:8-20.

[127] Hearing Transcript, pp. 213:16-19, 215:14-16, 221:8-20; SRCSD Hearing Exhibits, PowerPoint slide 35 ("*Cryptosporidium* represents the only microbial risk from SRWTP discharge.").

[128] See also Gerba Written Testimony, p. 2 ("In my experience spanning 33 years, I have not encountered a regulatory agency using a 1:10,000 risk threshold for contact recreation in surface waters.").

[129] See section V.D, *infra*.

With that said, however, the uncontroverted evidence in the record is that the DPH recommendation *is met* with *current* treatment. In particular, the uncontroverted evidence is:

The SRWTP does not increase risk of illness from *Giardia* in the river, due to inactivation of *Giardia* in the specific disinfection circumstances of the SRWTP.

and

Increased risk of illness from *Cryptosporidium* contributed by the SRWTP is much less than 1 in 100,000.[130]

The Regional Board did not consider this evidence at all. Again, the District reiterates that the DPH position is inappropriate. However, that position was that the SRWTP not increase the risk of infection by more than *1* in *10,000*. There is uncontroverted evidence in the record that the SRWTP does not cause an increase of this magnitude.

D. The Regional Board Did Not Comply With Water Code Sections 13263(a) and 13241 and the Findings Are Unsupported and Improper

The September Tentative Permit proposed filtration requirements.[131] Such requirements are, obviously, more stringent than necessary to implement any adopted WQO.

Water Code section 13241 provides:

> Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:
> (a) Past, present, and probable future beneficial uses of water.
> (b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
> (c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
> (d) Economic considerations.
> (e) The need for developing housing within the region.
> (f) The need to develop and use recycled water.

[130] Translated to risk of infection, this would mean much less than 2 in 100,000. All the values discussed above ignore potential contribution of other sources between the point of discharge and River Mile 44.

[131] September Tentative Permit, p. 33.

The Chief Counsel of the State Board, in a memorandum interpreting this provision, has explained the Regional Board's affirmative duty to develop and consider information on the section 13241 factors and engage in a "balancing" of factors to develop objectives consistent with the statute.[132]

Water Code section 13263(a) requires that, in the adoption of waste discharge requirements, the Regional Board consider, among other things, the WQOs reasonably required to protect beneficial uses and the provisions of Water Code section 13241. The State Board has recognized that a complete analysis of the Water Code section 13241 provisions is essential when, as here, the Regional Board proposes to adopt effluent limitations more stringent than those required by existing WQOs. If a Regional Board takes this approach, ". . . the rationale for the more stringent limitations must be explained in the permit findings . . . . In addition, the RWQCB must consider the factors specified in Water Code Section 13241[.]"[133] That is, if the Regional Board chooses to implement a more stringent objective on a permit-specific basis, it "must consider the factors specified in Water Code Section 13241."[134]

A conclusory assertion that the Regional Board has considered the Water Code section 13241 requirements is insufficient. The State Board has explained that, "when a Regional Board includes permit limits more stringent than limits based on an applicable numeric objective in the relevant basin plan, the Regional Board must address the section 13241 factors in the permit findings. These factors include, among others, economic considerations, environmental characteristics of the hydrographic unit under consideration, and the need for recycled water."[135] As such, the Regional Board must make findings related to each of the provisions of Water Code

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[132] Memorandum dated January 4, 1994, to Regional Water Board Executive Officers, from William R. Attwater, Chief Counsel of the State Board, re: Guidance on Consideration of Economics in the Adoption of Water Quality Objectives (Attwater Memorandum).

[133] *In the Matter of the Petition of City and County of San Francisco, et al.*, State Board Order No. WQ 95-4 (Sept. 21, 1995), p. 13; see also *In the Matter of the Petitions of Napa Sanitation District, et al.*, State Board Order No. WQ 2001-16 (Dec. 5, 2001), p. 24.

[134] *In the Matter of the Petition of the Cities of Palo Alto, Sunnyvale and San Jose*, State Board Order No. WQ 94-8 (Sept. 22, 1994), p. 11.

[135] *In the Matter of the Review on Own Motion of Waste Discharge Requirements Order No. 5-01-044 for Vacaville's Easterly Wastewater Treatment Plant*, State Board Order WQO 2002-0015 (Oct. 3, 2002), p. 35, footnote omitted.

section 13241.[136] Prior to the September Tentative Permit, the Regional Board routinely acknowledged such an obligation. The Regional Board would expressly state in permits that it was making specific findings "[i]n accordance with CWC Section 13241," including individual consideration of past, present, and future probable beneficial uses of the water, environmental characteristics of the hydrographic unit, water quality conditions that could be reasonably achieved, economics, the need for housing in the region, and the need to develop and use recycled water.[137]

The September Tentative Permit, however, made no reference at all to the Regional Board's obligations under Water Code sections 13263(a) and 13241 with respect to the proposed filtration requirements. In its comments on the September Tentative Permit, the District pointed out this glaring deficiency.[138]

The revised, November Tentative Permit included an entirely new discussion and findings regarding Water Code section 13241 factors.[139] The Regional Board afforded no opportunity for written comment on this substantial revision. In any event, the findings are superficial, incorrect, unsupported by evidence, and not consistent with the requirements of the Water Code.

As a preliminary matter, however, the District observes that the Permit suggests that *any* increase in risk from the SRWTP discharge, however small, would not be allowed.[140] Such a position is inconsistent with the Water Code[141] and, for that matter, with any recommendation or accepted risk level in the record.

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[136] See, e.g., State Board Order WQO 2002-0015, *supra*, p. 35 (issue remanded and Regional Board directed to revise its findings to expressly address Wat. Code, § 13241 factors which had not been addressed); see also State Board Order No. WQ 95-4, *supra*, pp. 13-14 (permit remanded to Regional Board for failure to consider the factors specified in Wat. Code, § 13241).

[137] See, e.g., Order No. R5-2007-0031-01 (City of Angels Wastewater Treatment Plant) pp. F-26 to F-28; Order No. R5-2007-0036, *supra*, pp. F-40 to F-41; Order No. R5-2007-0039 (Mountain House Community Services District), pp. F-43 to F-44.

[138] District's October 2010 Comments and Evidence Letter, pp. 6-7.

[139] See November Redline Tentative Permit, pp. F-77 to F-78; Permit, pp. F-79 to F-80. The Staff Response to Comments suggests that the Permit "merely implements existing water quality objectives" from the Basin Plan and that compliance with the Water Code is discretionary in this circumstance. (Staff Response to Comments, p. 6.)

[140] Permit, p. F-77.

[141] See, e.g., Wat. Code, §§ 13000, 13001, 13241, 13263(a).

1. Water Code Section 13263(a)

Under Water Code section 13263(a), the Regional Board must take into consideration, among other things, "the water quality objectives reasonably required" to protect beneficial uses. Nowhere does the Permit, or do findings in the Permit related to the filtration requirements, identify such WQOs or address this issue in any way. Neither of these suggestions is accurate.

2. Water Code Section 13241

In its hurriedly-crafted and superficial Water Code section 13241 "findings," the Regional Board did no more than advocate advanced treatment. Each of the Water Code section 13241 factors, and the deficiencies of Regional Board's findings, is addressed below.

Water Code section 13241(a) requires the Regional Board to consider the "[p]ast, present, and probable future beneficial uses of water." Here, the findings accurately list the beneficial uses of the Sacramento River and Delta. However, certain other discussion of beneficial uses merits attention. With respect to irrigation[142], during the course of Permit development, Regional Board staff requested that the District provide information on irrigation use of the Sacramento River. The District did so early in the renewal process. In 2004, the District provided evidence from a knowledgeable engineer who works with 25 Reclamation Districts in the Delta.[143] There are three types of pump designs used for withdrawing water from the Sacramento River: a vertical pump, a slant pump, and a siphon pump. Vertical pumps are set on a platform with a pipe going down vertically into the water. Slant pumps have a pipe running along the face of the levee. Siphon pumps are not used in the area near the District's outfall. Use of siphon pumps starts further south on the Sacramento River near Rio Vista. Neither slant nor vertical pumps go much below the surface with a typical depth between 5 feet and 10 feet below mean sea level. In fact, they are shallow enough that they run the risk of the pump cavitating at low tide. In addition, the pipes from these pumps do not stick out horizontally into the water. Therefore, they would draw water near the riverbank and, in general, outside the direct influence

[142] See Permit, pp. F-74 to F-75.

[143] See Letter dated December 15, 2004, to K. Landau, RWQCB, from R. Seyfried, SRCSD, re: NPDES Permit Responses to Comments Raised at Meeting of November 19, 2004.

of the SRWTP effluent plume, which emanates from a diffuser located on the river bottom in the middle of the river.

Modeling (calibrated and validated with multiple dye studies) has shown that up to 700 feet downstream of the discharge, no effluent (diluted or undiluted) is present in the river within approximately 100 feet of either riverbank. Typically, dilution is far greater than 20:1. At Harmonic Mean Flows, the river:effluent flow ratio is 56:1 for 181 mgd of effluent flow. At critical low river flows as represented by the lowest 7-day average flow expected to occur once in ten-years (7Q10) (i.e., 5820 cfs), dilution is 21:1 at a discharge rate of 181 mgd. River flows as low as the 7Q10 occur infrequently. Between 1970 and 2009, river flow was at or below 5820 cfs approximately 0.58 percent of the time.[144] In short, there is no evidence of any appreciable risk related to irrigation of food (or other crops) that would necessitate filtration.

Regional Board staff also requested that the District conduct the recreational user risk assessment described previously. As the Permit recites, contact recreation is considered the most sensitive use, such that, if it is protected, other beneficial uses will be protected.[145] However, the revised November Tentative Permit and Permit as adopted[146] also include generalized reference to Municipal (MUN) use. There is no evidence of any risk or any meaningful effect on risk to consumers of water of any kind; nor did DPH itself or anyone else identify any such risk as a concern. The nearest drinking water intake is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.[147] The California Urban Water Agencies (CUWA) stated that pathogens from the SRWTP "are not currently impacting drinking water

[144] District's October 2010 Comments and Evidence Letter, p. 8.

[145] See, e.g., Permit, p. F-75 ("DPH determined that if contact recreation is protected then agricultural irrigation and other Delta beneficial [sic] uses that could be impacted by pathogens would also be protected.").

[146] November Redline Tentative Permit, p. F-77; Permit, p. F-78.

[147] Permit, p. F-36. As stated in the District's October 2010 Comments and Evidence Letter and reflected in the record: *Giardia* and *Cryptosporidium* are not detected frequently in State Water Project waters according to the 2006 State Water Project Sanitary Survey. The source of waters for all of the drinking water treatment plants analyzed was classified as Bin 1 (no additional treatment required under Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)). (District's October 2010 Comments and Evidence Letter, p. 11 [referencing California State Water Project Watershed Sanitary Survey, 2006 Update, prepared for the Sate Water Project Contractors Authority by Archibald Consulting, Richard Woodward Water Quality Consultants, Palencia Consulting Engineers (June 2007)].)

quality/treatment[.]"[148] Similarly, a group of Delta export contractors recommended that disinfection requirements remain the same for existing flows.[149] The Permit refers to unspecified "small drinking water systems throughout the Delta" and suggests such systems "may" divert surface water with no treatment at all.[150] Again, there is no evidence of such use or where it supposedly occurs, let alone any evidence of a risk of any kind, let alone any significant risk, caused by the SRWTP to any consumers of water. In short, the Permit suggestions regarding MUN use are a red herring. As *DPH* identified, contact recreation is the appropriate focus.

In this regard, the District certainly concurs that the Regional Board should regulate for the reasonable protection of the REC-1 use. However, it is of little relevance to say that the Sacramento River and Sacramento-San Joaquin Delta supports 12 million recreational user days per year.[151] This number greatly overstates the use of the lower Sacramento River below the SRWTP discharge. In addition, non-contact recreational use such as hiking, sightseeing, birdwatching, and any other recreational activities distant from the immediate receiving water are not pertinent to the issue of impacts associated with the SRWTP discharge. Risk calculations referred to in the February 2010 Risk Assessment Report and Permit are based on a day of swimming. Risks associated with fishing and boating are much lower.[152] And, any effect on risk that could be attributable to the SRWTP diminishes as water moves downstream due to fate and transport processes and any additions of flow from other sources.[153] Again, the District does not dispute that downstream waters should have protection of REC-1 beneficial use consistent with

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[148] California Urban Water Agencies' February 1, 2010, Letter to K. Harder, *Comments on Issue Paper on NPDES Permitting Renewal Issues Drinking Water Supply and Public Health for the Sacramento Regional Wastewater Treatment Plant*, p. 2.

[149] Letter dated February 1, 2010, to Kathy Harder, RWQCB, from Walter Wadlow, Alameda County Water District, et al., re: Comments on Drinking Water Supply and Public Health Issues Concerning the Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal (Wadlow Letter), p. 15. Both CUWA as cited in the preceding footnote and the individual contractors in the Wadlow Letter advocated filtration for increases in discharge above current actual flow levels up to the 218 mgd that was contemplated as of the time the letters were sent, but there was no technical justification offered for this position.

[150] November Redline Tentative Permit, p. F-77; Permit, p. F-78.

[151] Permit, p. F-95.

[152] Gerba Written Testimony, pp. 2-3.

[153] Gerba Written Testimony, p. 3.

the Water Code, but the Permit is not forthright in regard to the nature and extent of the affected recreational beneficial use. Discussion beyond saying REC-1 is a beneficial use must be objective.[154]

Water Code section 13241(b) requires the Regional Board to consider the "[e]nvironmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto." The Regional Board failed to consider, or make findings on, this factor. The new "findings" for section 13241(b) state that, "the environmental characteristics of the hydrographic unit, including the quality of available water, will be improved by the requirement to provide tertiary treatment for this wastewater discharge."[155] This finding is meaningless. The hydrographic unit under consideration is, presumably, the lower Sacramento River. The quality of water available thereto would include background or upstream Sacramento River water quality. The Regional Board should have addressed levels of coliform or protozoa that exist in the absence of any discharge.

The Permit findings under section 13241(b) also state that tertiary treatment "will allow for the reuse of the diluted wastewater for food crop irrigation and contact recreation activities that would otherwise be unsafe according to recommendations from DPH."[156] The lower Sacramento River is not "unsafe," nor is there evidence that it is unsafe or has been pronounced unsafe by DPH or other health agencies. Again, the findings do not address at all the existence of risks that exist without any discharge. The Regional Board's purported "finding" is merely another argument for advanced treatment, and is not in any way responsive to the Water Code.

Water Code section 13241(c) requires the Regional Board to consider the "[w]ater quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area." The new finding in the Permit on this issue is merely a statement that "[f]ishable and swimmable water quality conditions can be reasonably achieved

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[154] In addition, email correspondence from Mr. Lischeske of DPH dated July 27, 2009, states: "Since a relatively small number of people actually get in the Sacramento River below the SRCSD outfall, we don't have a large population to protect from exposure to the effluent."

[155] Permit, p. F-79.

[156] Permit, p. F-79.

through the coordinated control of all factors that affect [sic] water quality in the area," with a description of categories of discharges.[157] The general recitation of the goals of the Clean Water Act, unaccompanied by any analysis, is insufficient. The Regional Board must address the quality of water that can be achieved in the lower Sacramento River. Further, there is simply no evidence that the Sacramento River and Delta are not "swimmable" today, or that the very minor effect on water quality from requiring filtration for the SRWTP discharge would convert the receiving water from "non-swimmable" to "swimmable."

Water Code section 13241(d) requires of the Regional Board to account for economic considerations. With regard to economics, the Permit "findings" include the following:

> The loss of beneficial uses within downstream waters, without the tertiary treatment requirement, which includes prohibiting the irrigation of food crops and prohibiting public access for contact recreational purposes, would have a detrimental economic impact.[158]

This finding borders on the absurd. There is no evidence whatsoever that any such prohibitions—which have never occurred—will occur, let alone any evidence of economic impacts. The "finding" regarding section 13241(d) also merely recites a range of estimates of capital costs to SRCSD and its ratepayers of filtration, without any specific finding or consideration of consequences, reinforcing that the consideration of costs is perfunctory.[159] This finding and another Permit finding also state that tertiary filtration for pathogens may also reduce concentrations of other pollutants.[160] There is no finding of any meaningful change in water quality that results with respect to other pollutants. In fact, the Permit actually ignores evidence that reductions in other pollutants from filtration would result in an immeasurable or *de minimus* change in ambient water quality. For example, the Permit vaguely states that filtration "will" reduce total organic carbon (TOC), without suggesting how much or whether there would be any

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[157] Permit, p. F-77.

[158] Permit, pp. F-77 to F-78.

[159] Permit, p. F-79; see also Attwater Memorandum, e.g., p. 3 (the obligation to take into account economic considerations includes "both the cost of providing treatment facilities and the economic value of development").

[160] Permit, pp. F-77, F-79 to F-80.

meaningful benefit. There is uncontroverted evidence in the record that the effects on water quality would be insignificant.[161]

The District stated in comments:

> Page F-75 of the Tentative Permit states that tertiary filtration will or may reduce discharge of other water quality constituents to an unspecified degree. The Regional Board has, of course, authority to require WQBELs where appropriate (and the Tentative Permit proposes WQBELs for some of the described water quality constituents). The Regional Board may not dictate how the District achieves compliance. The general reference to potential effects of filtration does not support the requirement. With respect to BOD and dissolved oxygen specifically, the District has proposed that the SRWTP be regulated to limit discharge of oxygen-demanding substances. The Tentative Permit makes no demonstration that reductions in the listed constituents will provide an important incremental benefit in terms of compliance with objectives or protection of beneficial uses.[162]

Indeed, the Staff Response to Comments acknowledges that the "additional benefits" of filtration identified in the Permit, whatever they may be, are "not reasons for requiring the level of treatment."[163]

Water Code section 13241(e) requires the Regional Board to consider "[t]he need for developing housing within the region." The Permit findings and analysis ignore altogether any comment or evidence in the record of adverse effects on the need for developing housing in the region.[164] Instead, the finding is that the requirement "will not adversely affect the need for

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[161] For example, incremental reduction in TOC concentrations resulting from advanced treatment technologies (including filtration) were specifically evaluated and modeled, and are reflected on pages 4-38 and 4-39 (Figures 4-16 and 4-17) of Technical Memorandum: Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant (Larry Walker Associates, May 2010). In those figures, Train A and Train C include filtration. Trains D and E include also reverse osmosis to varying degree. (*Id.*, p. III.) The report finds that the very slight changes in receiving water concentrations, even with the reverse osmosis alternatives, would likely not be measurable. (*Id.*, pp. 4-37 to 4-38.) And, there is no basis whatever to suggest that this immeasurable change would have meaning for beneficial uses. Similar analyses were performed for other parameters mentioned in the Permit, with similar conclusions. (See *id.*, pp. 4-13 to 4-15 [copper], 4-40 to 4-41 [mercury].) It should be noted that the "improvement" shown in this report is overstated because there is an assumed discharge and treatment of 218 mgd. Similar to the vague suggestions regarding reduction of other pollutants, qualitative Permit references to "much cleaner" effluents are hallow and merely argumentative. Further, for all discharges, WQBELs should be developed in accordance with applicable law and policy.

[162] District's October 2010 Comments and Evidence Letter, p. 16.

[163] Staff Response to Comments, p. 17. This passage and the Permit on page F-80 include speculation that tertiary treatment might reduce need for advanced treatment for other pollutants. The District is aware of no specific evidence of any such "savings" associated with compliance with other Permit provisions.

[164] See, e.g., Letter dated October 8, 2010, to Kenneth D. Landau, RWQCB, from Dennis M. Rogers, Building Industry Association, re: Comments on the Tentative Waste Discharge Requirements (NPDES Permit

housing in the area any more than for other adjacent communities."[165] While the finding is vague, there is no evidence to support it. Further, the finding does not comply with the statute in any event, as the statute does not invite such comparisons to other communities, vague or otherwise. The finding goes on to say that "[t]he potential for developing housing in the area will be facilitated by improved water quality[.]"[166] Again, there is no evidence in the record that would support that the extremely small change in Sacramento River quality that would result from filtration of the SRWTP discharge will facilitate the potential for housing at some (unspecified) location. The findings under this provision also again state that downstream water would not be "safe" for irrigation or recreation in the absence of filtration; as discussed above, this is unfounded.

Water Code section 13241(f) requires the Regional Board to consider the "need to develop and use recycled water." The Regional Board failed to do so, and its finding is not supported by evidence in the record. The new finding states that "[t]he need to develop and use recycled water is facilitated by providing a tertiary level of wastewater treatment that will allow for a greater variety of uses in accordance with CCR, Title 22."[167] The evidence does not support this finding. The District does not dispute that there is a broader range of potential direct re-use with tertiary effluent than secondary effluent. This does not, however, mean that recycling use (at some undefined location or locations) is promoted by requiring filtration of all flows at SRWTP (including even peak wet weather flows) prior to discharge to the Sacramento River. The Regional Board was informed by the District on this point as follows:

> The Regional Board must also consider the need to develop and use recycled water. (Wat. Code, § 13241(f).) Implementing full Title 22 tertiary treatment at SRWTP would significantly reduce the incentive and ability to recycle water, by diverting potential resources away from recycled water projects to a major

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No. CA0077682) and Time Schedule Order for Sacramento Regional County Sanitation District (SRCSD), Sacramento Regional Wastewater Treatment Plant (SRWTP); see also District's October 2010 Comments and Evidence Letter, p. 15 (filtration requirements "would adversely affect the need to develop housing in the region, by driving up the cost of housing through increased connection fees and users charges which directly affect the cost of living in a house").

[165] Permit, p. F-80.

[166] Permit, p. F-80.

[167] Permit, p. F-80.

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filtration and disinfection treatment project. To the extent recycled water uses require tertiary effluent, the demand can be met by sizing facilities (or, potentially, constructing satellite or scalping facilities) to meet the demand. Demand for recycled water only equates to a fraction of SRWTP flow. Expensive, advanced treatment for the entire flow requires allocation of additional funds that do not serve projected recycled water needs. Thus, requiring full tertiary treatment at SRWTP would act as a substantial economic disincentive to the development and use of recycled water by the District and would hinder rather than facilitate the development of recycled water in the Sacramento region.

Additionally, the District needs to partner with willing water purveyors to implement recycled water projects in their service areas since the District is not a water purveyor. Most of these water purveyors have other water supplies that are more readily available and less expensive compared to the use of recycled water at this time. Lack of funding is one of the key elements that affect the implementation of recycled water projects throughout the state and the Sacramento area. Thus, requiring full tertiary treatment at SRWTP will exacerbate this problem.[168]

The findings do not consider these facts, and the Staff Response to Comments document does not even address this comment and information.

The factors to be considered under Water Code section 13241 are not limited to those specifically enumerated in subdivisions (a)-(f).[169] In this instance, one other consideration is energy demand, which would include effects on greenhouse gas emissions. Uncontroverted evidence at the hearing established that the energy demands (ignoring construction itself) for operation of microfiltration facilities would be equivalent to the demand of 13,000 homes.[170] In its comments on the September Tentative Permit, the District stated, that, "energy demands associated with new treatment processes (and associated greenhouse gas emissions) must be considered to satisfy the Regional Board's obligations under sections 13241 and 13263 of the Water Code."[171]

The Staff Response to Comments does not respond to this comment at all, and the Regional Board ignored the issue.

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[168] District's October 2010 Comments and Evidence Letter, p. 15.

[169] See Wat. Code, §13241 ("Factors to be considered . . . shall include, but not necessarily be limited to, [subdivisions (a)-(f)].").

[170] Hearing Transcript, p. 174:8-10.

[171] District's October 2010 Comments and Evidence Letter, p. 15.

E. Best Practicable Treatment or Control (BPTC)

On page F-97, the Permit includes argument and conclusion that filtration is BPTC. This is incorrect based on the discussion above and section VII below, which addresses the "Satisfaction of Antidegradation Policy" section of the Permit in detail. Page F-77 of the Permit lists other POTWs that implement tertiary treatment and discharge to the Delta. However, those POTWs are not similarly situated to the District. They discharge to EDWs or areas where the Regional Board has found that adequate dilution does not exist, are new discharges, or have themselves proposed tertiary treatment. Entirely missing from the list in the Permit are POTWs that do not implement the tertiary filtration requirements the Permit would require of the District, such as (partial list[172]): Order No. R5-2007-0016 (Sacramento Municipal Utility District); Order No. R5-2007-0032 (City of Biggs); Order No. R5-2007-0041 (City of Red Bluff); Order No. R5-2007-0056 (City of Mt. Shasta); Order No. R5-2007-0058 (City of Redding); Order No. R5-2007-0069 (El Dorado Irrigation District); Order No. R5-2007-0098 (Tehama County Sanitation District No. 1); Order No. R5-2007-0134-01 (City of Yuba City); Order No. R5-2008-0108 (City of Rio Vista); Order No. R5-2008-0162 (Tuolumne Utilities District and Jamestown Sanitary District); Order No. R5-2008-0179 (Town of Discovery Bay CSD); Order No. R5-2009-0007 (San Andreas Sanitary District); Order No. R5-2009-0078 (Chester Public Utility District); Order No. R5-2010-0019 (City Of Chico); Order No. R5-2010-0073 (Sewerage Commission-Oroville); Order No. R5-2010-0080 (City of Corning); Order No. R5-2010-0081 (City of Rio Vista).

If a determination of BPTC is relevant and appropriate in consideration of the dilution provided in the receiving water, *de minimus* nature of risk posed by the current discharge, and costs (economic, environmental, and otherwise) of the Permit filtration requirements, the current level of treatment and disinfection provides BPTC.

[172] The list is a partial list of POTWs who discharge to surface water in the Central Valley region and do *not* have the filtration requirements required of SRWTP in the Permit.

F. Conclusion Regarding Filtration

The Permit analysis resulting in the filtration requirements is not objective, complete, or accurate. There is no meaningful benefit to public health, water quality, or beneficial uses associated with the highly costly filtration requirements, and they are not reasonable by any measure. The State Board should modify the Permit, striking the tertiary filtration requirements and ordering that the total coliform, BOD, and TSS limitations shall, for the life of Order No. R5-2010-0114, be those provided in Regional Board staff "Disinfection Alternative 1," as reflected in paragraph 6.B.ii of the District's Petition.

VI. THE PERMIT IMPROPERLY INCLUDES FINAL EFFLUENT LIMITATIONS AND DENIES MIXING ZONE FOR AMMONIA BASED ON ALLEGED FAR FIELD IMPACTS

The Permit includes effluent limitations for ammonia of 1.8 mg/L as an average monthly effluent limitation (AMEL) and 2.2 mg/L as a daily maximum effluent limitation (MDEL).[173] The limits were calculated based on U.S. EPA's *1999 Aquatic Life Ambient Water Quality Criteria for Ammonia Update* (U.S. EPA ammonia criteria).[174] The limits so-calculated apply end-of-pipe without the consideration of dilution for acute or chronic aquatic life criteria.[175]

The application of end-of-pipe limits and denial of dilution credits in this Permit are in conflict with the Regional Board's normal permitting process and state and federal law. Typically for ammonia, and as the first step here, the Regional Board uses U.S. EPA ammonia criteria to translate the narrative toxicity objective and determine if the discharge has reasonable potential to cause or contribute to a violation of that objective.[176] So too here, the Regional Board effectively treated the U.S. EPA ammonia criteria as the WQO.[177] If the discharge has reasonable potential to exceed the U.S. EPA ammonia criteria, the Regional Board determines if mixing

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173 Permit, p. 14.

174 Permit, pp. F-54, F-57.

175 Permit, pp. F-55 to F-57.

176 See state's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (SIP), pp. 5-6; see, e.g., Order No. R5-2007-0036 (City of Tracy), p. F-30; Order No. R5-2007-0113 (City of Lodi), pp. F-22 to F-23; Order No. R5-2010-0092 (Placer County Department of Facility Services), p. F-38; see also Basin Plan, p. IV-17.00; 40 C.F.R. § 122.44(d)(1)(i).

177 Permit, pp. F-54 to F-55.

zones are proper based on studies and information submitted by the discharger and the availability of assimilative capacity.[178] When it determines that mixing zones are proper, the Regional Board then calculates effluent limitations based on applicable regulations and procedures and with consideration of dilution.[179]

Using this approach, the Regional Board does not dispute that there is sufficient flow and assimilative capacity to allow mixing zones for compliance.[180] However, in this case, the Regional Board abandoned the regulatory process set forth in the SIP and Basin Plan, and employed in other Regional Board permits. Instead, the Regional Board denied the mixing zones based on alleged effects of ammonia "far downstream of the discharge within the Delta[.]"[181] The denial had nothing to do with the effect of the mixing zone itself and discounted that the ammonia concentrations downstream are well below the U.S. EPA ammonia criteria.

The Regional Board's denial of mixing zones is improper on several fronts. First, the determination of negative effects is not supported by proper findings based on evidence in the record. Second, impacts of lower concentrations "far downstream in the Delta" (far field impacts) are unrelated to determinations for acute and chronic aquatic life mixing zones based on the U.S. EPA ammonia criteria. The limits adopted are unrelated to the need for compliance with the U.S. EPA ammonia criteria within or outside a mixing zone, and the Regional Board failed to comply with applicable state and federal regulations for interpreting and applying narrative toxicity objectives to the far field.

Ultimately, the Permit takes a shotgun approach to the denial of mixing zones for ammonia, citing 11 reasons why dilution credits are denied.[182] The reasons are deeply flawed on

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[178] SIP, pp. 15-18; Basin Plan, p. IV-16.00.

[179] SIP, p. 8; see, e.g., Order No. R5-2010-0073 (Sewerage Commission-Oroville Region), p. F-29; Order No. R5-2010-0044 (Shasta County Service Area No. 17), p. F-25.

[180] See, e.g., Staff Report, p. 13 ("If only USEPA's recommended water quality criteria for ammonia are considered, there is sufficient flow and assimilative capacity to allow mixing zones for compliance.").

[181] Permit, pp. F-40 to F-41; Staff Report, p. 7, 16.

[182] Permit, pp. F-56 to F-57. One of the reasons provided, "[a] consensus of scientific experts concluded the SRWTP is a major source of ammonia to the Delta," is a statement of fact unrelated to determinations regarding impacts to aquatic life and the denial of mixing zones. As such, it is an improper finding that should be voided, and there is no need for further discussion below.

a technical level and disastrously flawed as a matter of law and applicable regulatory process. Further, the Regional Board must support its decisions with specific findings based on evidence in the record. In particular, the Regional Board must "set forth findings to bridge the analytic gap between the raw evidence and ultimate decision or order."[183] The findings must also be supported by evidence in the record.[184] The Permit fails this test. The District discusses these matters below, as follows.

First, the District explains why the Regional Board's attempt to rely on SIP criteria for denial of ammonia mixing zones is incorrect.[185] Next, the District discusses alleged effects to aquatic resources including "far downstream in the Delta" and explains why findings that pertain to such effects are erroneous, and why such alleged effects are not properly relied upon—as a legal matter, to deny the mixing zones.[186] Thereafter, the District addresses the impropriety of denying mixing zones for ammonia toxicity on the basis of completely distinct different water quality constituents (dissolved oxygen, nitrosamines), un-adopted water quality criteria, and Best Practicable Treatment or Control (BPTC).[187]

A. Far Field Impacts Are Unrelated to Acute and Chronic Mixing Zone Determinations

As is described below, even if one accepts that there are adverse effects of ammonia for downstream at concentrations below U.S. EPA criteria, the Regional Board has improperly denied mixing zones that are based on compliance with the U.S. EPA criteria outside the mixing zone.

1. Purpose of Mixing Zones

A mixing zone is generally defined as, "[a]n area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as

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[183] *Topanga Assn. for a Scenic Community v. County of Los Angeles* (1974) 11 Cal.3d 506, 515 (*Topanga*); see *In Re Petition of the City and County of San Francisco, et al.*, State Board Order No. WQ 95-4 (Sept. 21, 1995), pp. 10, 13.

[184] *Topanga, supra*, 11 Cal.3d, pp. 514-515.

[185] Subsection B below.

[186] Subsection A below.

[187] Subsections C, D below.

acutely toxic conditions are prevented."[188] Similarly, the Permit defines a mixing zone as, "[a] limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body."[189] Thus, when a mixing zone is allowed, water quality criteria may be exceeded within the mixing zone and applicable water quality criteria and/or objectives are met at the edge of the mixing zone.[190]

When determining if the allowance of mixing zones are appropriate, the Regional Board relies on provisions in the SIP, Basin Plan, and TSD.[191] Overall, in allowing mixing zones, beneficial uses need to be protected and the overall integrity of the water body should not be compromised.[192] Compliance with water quality criteria/objectives at the edge of mixing zones will ensure that beneficial uses are protected. There is no dispute that when considering application of U.S. EPA's ammonia criteria that such criteria are met at the edge of the mixing zones supported by the District. However, the Regional Board relied improperly on effects far downstream of concentrations well below U.S. EPA's ammonia criteria to find that allowance of mixing zones for ammonia would affect beneficial uses and compromise the integrity of the water body. Unless and until other criteria are properly adopted or determined, mixing zones must be allowed.

2. The Regional Board's Denial Based on the SIP Is Unrelated to Acute and Chronic Mixing Zones[193]

The September Tentative Permit included the first ten of eleven factors now cited for denying the ammonia mixing zones that would result in compliance with the U.S. EPA ammonia

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[188] U.S. EPA *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) (March 1991) (TSD), p. glossary XX.

[189] Permit, p. A-4.

[190] See 2000 Final Functional Equivalent Document (FED) for the SIP, p. V-45, fn. 15 ("If a mixing zone is allowed, the 'point of application' of criteria/objectives is at the edge of an allowed mixing zone; . . . . ").

[191] Permit, pp. F-28 to F-30.

[192] 2000 Final FED for the SIP, p. V-45; see also Basin Plan, p. IV-16.00; TSD, pp. 33-34.

[193] There is a question as to the applicability of the SIP to ammonia as ammonia is not a priority pollutant. Regardless, the Regional Board's denial under the SIP or similar conclusions under the Basin Plan are improper.

criteria at the edge of the mixing zones.[194] In comments, the District explained that none of the ten were justification for denial of the mixing zone. The District further explained that, in fact, only three of the reasons even potentially had anything to do with toxicity in the mixing zones. The District further explained that if effluent limitations for ammonia were to be developed based on any of the issues identified, that that must occur in accordance with applicable law.[195] The revised November Tentative Permit added an additional conclusion: that the mixing zone would not meet three SIP criteria.[196] This is erroneous.

When allowing a mixing zone for an incompletely mixed discharge, the SIP establishes eleven different criteria.[197] Of the eleven criteria, the Regional Board determined that for ammonia three criteria are not met.[198] However, the Permit fails to articulate or explain how or why the allowance of acute and chronic mixing zones for ammonia is related to the three criteria. More specifically, the SIP states: "a mixing zone shall not: (1) compromise the integrity of the entire water body; . . . (4) adversely impact biologically sensitive or critical habitats, including but not limited to, habitat of species listed under federal or state endangered species laws; (5) produce undesirable or nuisance aquatic life . . . ."[199] In this case, the District provided evidence to show that in fact the granting of acute and chronic aquatic life mixing zones for ammonia will not violate the three criteria specified.

Further, while the granting of a mixing zone is within the Regional Board's discretion, denial of mixing zones may not be arbitrary and the Regional Board must consider all information in the record, the cost to the discharger, and lack of harm *associated with such* a mixing zone.[200]

[194] September Tentative Permit, pp. F-54 to F-56.

[195] District's October 2010 Comments and Evidence Letter, pp. 44-47. In general, these comments remain applicable: issues addressed there are also included in the substance of this Statement of Points and Authorities. The District does reiterate specifically that the fact that the SRWTP is a major source of ammonia to the Delta (Permit, p. F-56(2)) is not a basis for denying a mixing zone.

[196] See November Redline Tentative Permit, pp. F-40 to F-41, F-58 to F-54; Permit, p. F-27.

[197] SIP, p. 17.

[198] Permit, p. F-40.

[199] SIP, p. 17, underline omitted.

[200] *In the Matter of the Petition of Yuba City*, State Board Order WQO 2004-0013 (July 22, 2004), p. 12 ("While granting a mixing zone is discretionary, in reaching our conclusion we consider that the Regional Board did not fully consider information in the record, the high cost to meet the effluent limitations without allowing this dilution credit,

It is beyond debate that the Regional Board's denial has nothing to do with any harm associated with the mixing zones themselves and there exists no evidence that allowing the mixing zones for ammonia will result in harm to beneficial uses or the environment.[201] Rather, the denial of the mixing zones was simply a vehicle to require full nitrification related to the SRWTP's discharge. Consider, for example, what the specific effluent limitations for ammonia would be if there were no U.S. EPA ammonia criteria or if the calculation of end of pipe criteria happened to produce different values than the effluent limitations in the Permit. The limitations would undoubtedly be different than those in the Permit itself. This reinforces that the denial of the mixing zones is unrelated to the mixing zones themselves, and improper.

In general, the Permit and its supporting documents do not include any explanation or identify any evidence as to how acute and/or chronic mixing zones for ammonia fail to meet the three specified criteria. This alone is unlawful and mere conclusions are not proper and do not satisfy the Regional Board's obligations to set forth findings based on evidence in the record and bridge the analytic gap between the raw evidence and conclusions.[202] To the contrary, evidence in the record exists to show that acute and/or chronic mixing zones for ammonia meet these three specified criteria as well as all the other criteria.

In fact, the effort to rely on SIP criteria is, on a legal level, an end-run of the Regional Board's obligation to bridge the analytical gap between the evidence and the ordered effluent limitations. It is also an end-run of the Regional Board's obligations with respect to implementation of narrative water quality objectives and the numeric objective for dissolved oxygen, as discussed further below.

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and the lack of evidence of any harm associated with such a mixing zone."); see also *In the Matter of the Petitions of East Bay Municipal Utility District and Bay Area Clean Water Agencies*, State Board Order WQO 2002-0012 (July 18, 2002), pp. 15-16 ("For example, if the background concentration were below water quality objectives, and aquatic organism tissue concentrations were below protective concentration thresholds, then some allowance of dilution might be appropriate—particularly where it is clear that source control measures will not result in attainment of effluent limits without dilution credit and advance treatment would be required.").

[201] See section VI.B, *post*.

[202] *Topanga, supra,* 11 Cal.3d, p. 515; see State Board Order WQ 95-4, *supra*, pp. 10, 13; see also State Board Order WQO 2004-0013, *supra*, p. 12 (regional board must consider all the information in the record).

Pursuant to federal regulatory requirements, when establishing effluent limitations due to a finding that the effluent has reasonable potential to violate a narrative criteria (e.g., toxicity), as was done here, the Regional Board must use a calculated numeric water quality criteria derived from, ". . . a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant form the Food and Drug Administration, and current EPA criteria documents; . . . ."[203] The effects levels identified in preliminary studies referenced in the Permit, for example, are not proposed state criteria, thus the Regional Board must rely on a regulation that allows for the interpretation of narrative objectives.[204]

With respect to interpreting narrative objectives pursuant to an explicit state policy or regulation, the Basin Plan includes a policy that requires the Regional Board to consider, ". . . on a case-by-case basis, direct evidence of beneficial use impacts, all material and relevant information submitted by the discharger and other interested parties, and relevant numerical criteria and guidelines developed and/or published by other agencies and organizations . . . ."[205]

There exist in the Basin Plan narrative water quality objectives that relate to the type of impacts alleged to occur from low concentrations of ammonia far downstream of the discharge.[206]

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[203] 40 C.F.R. § 122.44(d)(1)(vi)(A).

[204] See, e.g., section VI.B.1.b.iii, *post*.

[205] Basin Plan, p. IV-17.00.

[206] Narrative objectives potentially implicated by the ammonia-related issues discussed in the Permit include:

> **Biostimulatory Substances**
> Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.
>
> * * *
>
> **Chemical Constituents**
> Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses . . . .
>
> * * *
>
> **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. (Basin Plan, pp. III-3.00, III-8.00.)

Again, setting aside shortcomings of technical analysis, the Regional Board simply skipped over its obligations related to implementation of narrative objectives.[207]

a. Acute and Chronic Aquatic Life Mixing Zones For Ammonia Will Not Compromise the Integrity of the Entire Water Body

The District provided evidence to support an acute aquatic life mixing zone that extends 60 feet downstream, and a chronic aquatic life mixing zone that extends 350 feet downstream.[208] With respect to an acute aquatic life mixing zone, the Sacramento River is approximately 600 feet wide while the proposed mixing zone is only 300 feet wide (the width of the diffuser) by 60 feet downstream.[209] Further, the acute mixing zone begins along the bottom of the river at the submerged diffuser and would not reach the surface of the river.[210] In comparison, the Sacramento River extends over 40 miles downstream from the discharge to San Francisco Bay. The TSD states, "[i]f the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that they do not impinge on unique or critical habitats."[211] Accordingly, because the combined mixing zones for the SRWTP's discharge are small in comparison to the river segment, there is expected be little effect on the integrity of the water body as a whole (unlike, for example, granting a mixing zone in an EDW that occupies the entire water body). Thus, an acute aquatic life mixing zone would not compromise the integrity of the entire water body. Likewise, the chronic aquatic life mixing zone of 350 feet would also not compromise the integrity of the entire water body because the mixing zones combined are small in comparison to the river segment in question.

Under any circumstances, and as discussed further below, the Regional Board did not provide findings that ammonia (in contrast to the mixing zone) impairs the entirety of the

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[207] See, e.g., section VI.B.1.b.iii, *post*.

[208] Permit, pp. F-112, J-9; see also District's October 2010 Comments and Evidence Letter, p. 80.

[209] District's October 2010 Comments and Evidence Letter, p. 80.

[210] District's October 2010 Comments and Evidence Letter, p. 80.

[211] TSD, p. 34.

Sacramento River and Delta.[212] The Regional Board's reliance on the SIP provisions is an obvious avoidance of its obligations with respect to establishing effluent limitations when writing permits and implementing narrative criteria and objectives and the dissolved oxygen objective.

b. Acute and Chronic Aquatic Life Mixing Zones for Ammonia Will Not Adversely Impact Biologically Sensitive or Critical Habitats, Including, But Not Limited To, Habitat of Species Listed Under Federal or State Endangered Species Laws

As clearly indicated in the Permit, the Regional Board is concerned with far field impacts—not those in the near field.[213] However, as discussed below, the Permit fails to include findings supported by substantial evidence in the record to show that discharges from the SRWTP are adversely impacting biologically sensitive or critical habitats—inside or outside of the acute and chronic aquatic life mixing zones.[214] Considering that SRWTP discharges are not impacting biologically sensitive or critical habitats, and the lack of evidence indicating otherwise, the Regional Board has improperly denied acute and chronic mixing zones for ammonia based on this criterion. Most importantly with regard to the SIP criterion relied upon, the deficiency in the Permit is that the alleged impacts are *outside* the mixing zone. The Regional Board has not made findings to support that the *mixing zones* themselves have adverse impacts, but that *downstream* concentrations have adverse effects. Setting aside technical deficiencies, the Regional Board bypassed its obligations related to implementation of narrative objectives or criteria, consideration of all information in the record, and to make findings that are supported by evidence in the record.[215]

c. Acute and Chronic Aquatic Life Mixing Zones for Ammonia Will Not Produce Undesirable or Nuisance Aquatic Life

The Regional Board also improperly denied mixing zones by claiming that the establishment thereof would produce undesirable or nuisance aquatic life. The Regional Board

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[212] *Topanga, supra,* 11 Cal.3d, p. 515; see also State Board Order WQO 2004-0013, *supra*, p. 12.

[213] See Permit, pp. F-40 to F-41; see also Staff Report, p. 13.

[214] See, e.g., section VI.B.1.a (no toxicity to delta smelt); see also section VI.B.1.b (discussion on copepods).

[215] See section VI.B, *post*; see also State Board Order WQO 2004-0013, *supra*, p. 12.

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fails to explain in any manner how it reached this conclusion. To the extent the Regional Board may be referring to effects on copepods, diatom primary production, and/or shifts in algal species (discussed further below), there exist tremendous uncertainty with respect to finding that ammonia discharges from the SRWTP are causing acute and/or chronic toxicity to copepods, inhibiting diatom primary production, or causing shifts in algal species.[216] As is well-documented below, the preliminary study results associated with acute toxicity to copepods is not based on results at environmentally relevant levels of pH, the chronic toxicity effects levels are based on preliminary, hearsay evidence from unpublished works, and, there is no real evidence that indicates SRWTP discharges are the cause of inhibition to diatom primary production and/or causing a shift in algal species.[217] Accordingly, as discussed below, because the Regional Board's findings with respect to copepods, inhibition to diatom production, and shifts in algal species are not supported by evidence in the record, the Regional Board cannot use such findings to support its denial of mixing zones for ammonia.

Further, the District, like all other dischargers that are granted acute and chronic mixing zones, must ensure that receiving water quality criteria are met outside the mixing zones. As is shown in the District's dynamic modeling studies, and as acknowledged by the Regional Board, water quality criteria based on U.S. EPA's ammonia criteria are met outside the mixing zones.[218] If in the future appropriate water quality criteria for the protection of copepods, diatoms, and/or shifts in algal species are developed, the Regional Board maintains the authority to re-open the Permit and adopt new effluent limitations accordingly.[219] However, until such time that other criteria are appropriately developed, the Regional Board cannot arbitrarily deny mixing zones based on preliminary study results and speculative hypothesis.

Finally, again, the Regional Board's use of these pseudo-criteria is *unrelated* to the mixing zones. If there is nuisance aquatic life as a result of low ammonia concentrations downstream of

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[216] See section VI.B.1, *post*; Permit, p. F-56, ¶¶ (1), (3), (4), (5), (6).

[217] See section VI.B.1, *post*.

[218] Staff Report, pp. 6, 13.

[219] See Permit, p. 24.

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the discharge, the Regional Board must interpret the narrative objective(s) implicated, and the Regional Board must comply with federal regulations and the Basin Plan when doing so. As stated previously, even if one *accepts* that ammonia at lower concentrations has effects in the far downstream areas, this is unrelated to the mixing zones themselves. The Regional Board is required to determine reasonable potential and develop numeric effluent limits based on the applicable objective. Here, the Regional Board merely denied mixing zones for reasons that do not relate to the mixing zones themselves.

B. The Regional Board's Findings For Denial of Mixing Zones Are Not Supported by Evidence in the Record

The Permit readily admits that acute and chronic aquatic life mixing zones comply with the SIP and the Basin Plan), except for ammonia.[220] With respect to ammonia, as discussed above, the Permit claims that the SIP is not satisfied because an acute mixing zone for ammonia would: (1) compromise the integrity of the entire body; (2) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or state endangered species laws; and (3) produce undesirable or nuisance aquatic life.[221] Specifically, the Permit claims that these elements of the SIP have not been met "because ammonia discharges from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta, not just the areas defined by the requested mixing zone."[222] The Permit also includes ten other findings (which are supposedly discussed in detail in Attachment J) as to why denying dilution credits for ammonia is appropriate.[223] However, the findings in general and the information in Attachment J are not supported by evidence in the record. Further, in some cases, the evidence allegedly relied on by the Regional Board is not actually in the record and is not publicly available. Finally, as

[220] Permit, pp. F-35 to F-38.

[221] Permit, p. F-40.

[222] Permit, pp. F-40 to F-41.

[223] Permit, pp. F-56 to F-57.

discussed throughout, even if the findings all were accurate, the Regional Board has not complied with applicable law in establishing the specific effluent limitations in the Permit.

1. Findings Regarding Far Field Aquatic Life Impacts Are Not Supported by Evidence in the Record

As the written testimony and hearing testimony of Dr. Diana Engle describes, over recent years, there has been a series of hypotheses advanced concerning effects of ammonia from the SRWTP on beneficial uses downstream:

> Over the last three years, a series of hypotheses has cropped up regarding ammonia's potential effects on aquatic life in the delta. Agencies and interested parties have energetically funded research addressing these hypotheses which has been repeatedly evaluated at workshops, by independent panels, and through various State and federal processes that are currently underway.
>
> As detailed in the district's comments, none of the independent reviews have revealed a consensus that ammonia is a key driver of ecological problems in the delta, including the pelagic organism decline. This slide [SRCSD Hearing Exhibits, powerpoint slide 17] condenses some of the key points about ammonia contained in my testimony and in the district's comments. It illustrates a pattern of investigation that re-enforces the importance of distinguishing between hypothesis and facts. Several hypotheses asserted as facts a short time ago in some circles are no longer supported by available information from the delta.[224]

Indeed, and despite suggestions by Regional Board staff that there is some type of consensus around effects of ammonia and at low concentrations in the Delta, there are only hypotheses and uncertainty.[225] The State Board itself examined the issue just last year, convened an "other stressors" panel in connection with its informational proceeding on Delta flow issues, and concluded only that more study is appropriate.[226]

Nevertheless, the Regional Board imposed costly regulation on the District related to ammonia. As Dr. Engle explained, in so doing, the Regional Board also relied in key areas on

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[224] Hearing Transcript, p. 187:7-24. Dr. Engle also provided written testimony reflecting material stated in the District's October 2010 Comments and Evidence Letter. (Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal, [Written] Testimony/Comments of Diana L. Engle, Ph.D., of Larry Walker Associates on the Potential Roles of Ammonia and Nutrient Ratios in the Upper San Francisco Estuary (Engle Written Testimony), p. 4; District's October 2010 Comments and Evidence Letter, pp. 16-38.)

[225] See District's October 2010 Comments and Evidence Letter, pp. 16-38.

[226] State Water Resources Control Board (2010) Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem. August 3, 2010 (SWRCB 2010); see also District's October 2010 Comments and Evidence Letter, pp. 19-20.

highly preliminary research, undocumented or poorly documented field and lab work, and unreviewed or publicly unavailable information.[227] The Regional Board was too eager to find a culprit rather than base a decision on sound science. It improperly denied mixing zones for the U.S. EPA ammonia criteria based on logic that is not supportable from a scientific or regulatory perspective.

The Permit, preceding the SIP determination, includes several specific findings with respect to alleged far field aquatic life impacts supposedly caused by discharges from the SRWTP:

- Recent studies suggest that ammonia at ambient concentrations in the Sacramento River, Delta, and Suisun Bay may be acutely toxic to native *Pseudodiaptomus forbesi (copepod).*
- Recent studies provide evidence that ammonia from the SRWTP discharge is contributing to inhibition nitrogen uptake by diatoms in Suisun Bay.
- Ammonia, along with the clam *Corbula*, and high turbidity are attributed to reducing diatom production and standing biomass in the Suisun Bay.
- Downstream of the discharge point, ammonia may be a cause in the shift of the aquatic community from diatoms to smaller phytoplankton species that are less desirable as food species.
- Regardless of whether ammonia is directly or indirectly contributing to the pelagic organism decline (POD), ammonia is shown to affect adult *Pseudodiaptomus forbesi* reproduction at concentrations greater than or equal to 0.79 mg/L. And nauplii and juvenile *Pseudodiaptomus forbesi* are affected at ammonia concentrations greater to or equal 0.36 mg/L. These ammonia concentrations can be found downstream of the discharge. The beneficial use protection extends to all aquatic life and not limited to pelagic organisms.[228]

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[227] Engle Written Testimony, p. 4; Hearing Transcript, pp. 188:13-193:5; SRCSD Hearing Exhibits, PowerPoint slides 17-19.

[228] Permit, p. F-56.

Attachment J of the Permit provides discussion that is the presumed basis for the above conclusions, and addresses three alleged connections between ammonia in SRWTP effluent and the POD: "(1) inhibiting diatom primary production in the Sacramento River downstream of the discharge point, in Suisun Bay and in the Delta, (2) causing acute and/or chronic toxicity to delta smelt and *Pseudodiaptomus forbesi*, an important food organism for larval and juvenile fish, and (3) causing a shift in the algal community from nutritious species of diatoms to less desirable forms like *Microcystis (blue green algae)*."[229] However, the evidence relied on by the Regional Board does not support the Permit's findings, or at most, is uncertain and supports only that further study is warranted. In either case, as shown below, the evidence fails to support Permit limits without the consideration of dilution that then require full nitrification of effluent from the SRWTP.

a. Evidence in the Record Demonstrates That Ammonia Is Not Causing Acute or Chronic Toxicity to Delta Fish

As acknowledged in Attachment J of the Permit, the evidence indicates that ambient ammonia concentrations throughout the upper San Francisco Estuary (SFE) are not high enough to cause acute toxicity to delta smelt or the wide range of aquatic organisms explicitly protected by current U.S. EPA ammonia criteria.[230] This characterization of ambient conditions applies not only to the POD years (2002 onward), but also to the entire 35-year period for which long-term monitoring data are available, and applies to the entire reach of the Sacramento River below the SRWTP discharge (e.g., River Mile 44 and points downstream).[231]

The U.S. EPA acute criterion for ammonia that applies to water bodies with salmonids present was specifically derived to protect rainbow trout.[232] Because repeated rounds of testing

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[229] Permit, p. J-1.

[230] See Permit, p. J-2; see also Staff Response to Comments, p. 20 ("Central Valley Water Board staff concur that ammonia levels after mixing with the receiving water are not sufficiently elevated to cause toxicity to Delta smelt."); see also District's October 2010 Comments and Evidence Letter, pp. 23-25.

[231] District's October 2010 Comments and Evidence Letter, p. 23; Engle Written Testimony, p. 4.

[232] U.S. EPA. 1999. *1999 Update of Ambient Water Quality Criteria for Ammonia*. EPA 822-R-99-014. United States Environmental Protection Agency, December 1999 (U.S. EPA 1999).

indicate that delta smelt have similar acute sensitivity to ammonia as rainbow trout,[233] the U.S. EPA acute criterion is appropriately considered protective of delta smelt. Attachment J references two recent studies that indicate ambient concentrations of ammonia throughout the estuary (including in the Sacramento River below the SRWTP) meet the U.S. EPA ammonia criteria:

- Engle[234] compared U.S. EPA acute and chronic criteria with ambient ammonia concentrations from almost 12,000 grab samples taken throughout the freshwater and brackish estuary from 1974 to the present. The dataset included monitoring results from the Interagency Ecological Program (IEP), U.S. Geological Survey (USGS), Department of Water Resources (DWR), U.S. Fish and Wildlife Service (USFWS), the District, and the University of California (UC) Davis Aquatic Toxicology Lab.[235] In this large dataset, ammonia concentrations in the ambient waters *never* exceeded the U.S. EPA acute criterion, and the chronic criterion was exceeded *only twice* in the available record (one sample each in 1976, 1991). Margins of safety were large: the chronic criterion exceeded ambient concentrations by average factors of 40 and 80 in the brackish and freshwater estuary, respectively.

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[233] Werner, I., L.A. Deanovic, M. Stillway, and D. Markiewicz. 2008. *The Effects of Wastewater Treatment Effluent-Associated Contaminants on Delta Smelt*. Final Report to the Central Valley Regional Water Quality Control Board. September 26, 2008 (Werner et al. 2008).

Werner, I., L.A. Deanovic, M. Stillway, and D. Markiewicz. 2009. *Acute toxicity of Ammonia/um and Wastewater Treatment Effluent-Associated Contaminant on Delta Smelt - 2009*. Final Report to the Central Valley Regional Water Quality Control Board. December 17, 2009 (Werner et al. 2009).

[234] Engle, D. 2010a. Testimony before State Water Resources Control Board Delta Flow Informational Proceeding. Other Stressors-Water Quality: Ambient Ammonia Concentrations: Direct Toxicity and Indirect Effects on Food Web. Testimony submitted to the State Water Resources Control Board, February 16, 2010 (Engle 2010a).

[235] See Figure 1 (Map of monitoring locations and samples taken at each monitoring location).

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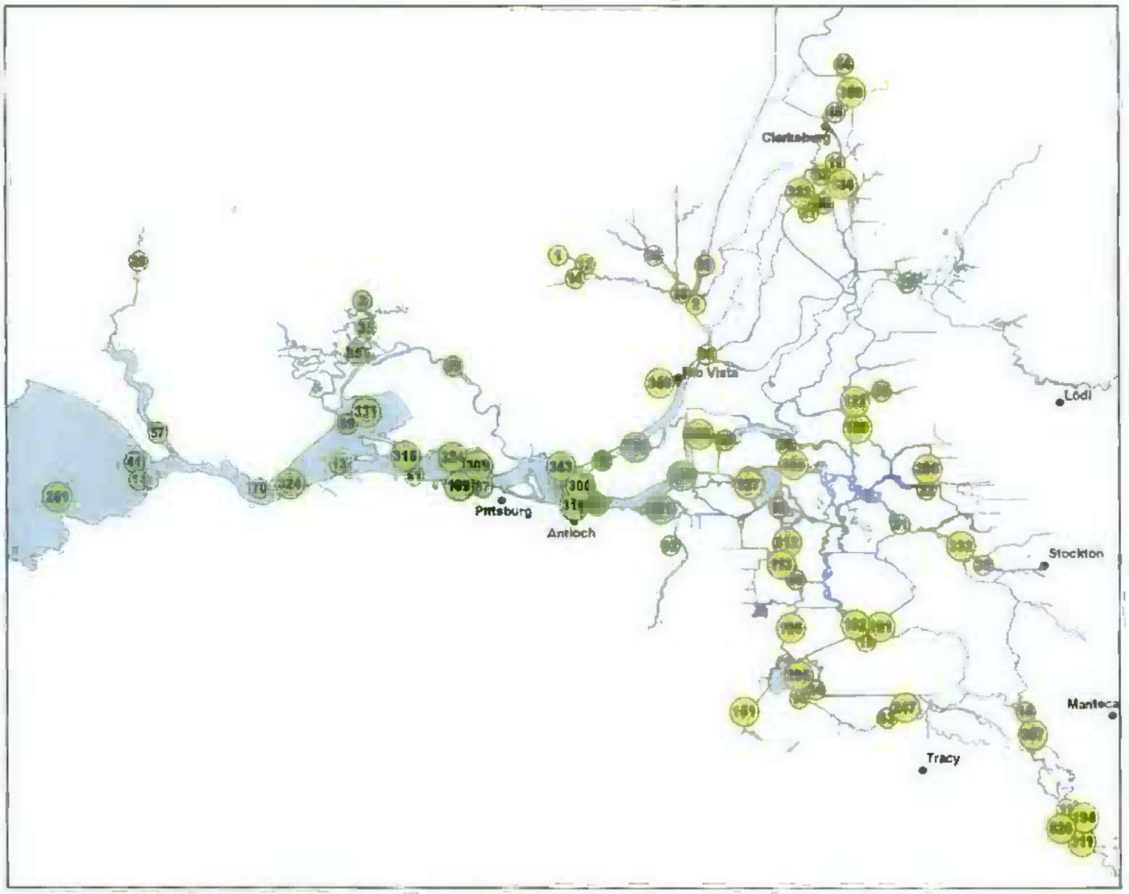

Figure 1. Long-term estuarine (green symbols) and freshwater (yellow symbols) monitoring stations in the Upper SFE provide co-occurring measurements of pH, water temperature, and total ammonia. Values inside symbols are numbers of monthly or bi-weekly grab samples taken during the period 1974-2010. Stations were classified as estuarine or freshwater based on procedures specified in the California Toxics Rule. Figure is from Engle 2010a.[236]

- Regional Board staff conducted ambient water sampling at 21 sites in the freshwater Delta between March 2009, and February 2010.[237] None of staff's measurements of ammonia exceeded the U.S. EPA ammonia criteria for both acute and chronic conditions. In addition, Regional Board staff screened their ambient data using an ultra-conservative, hypothetical chronic criterion for delta smelt created by using the highest of three Acute to Chronic Ratios (ACRs) (20.7, 9.7, 6.5) for fathead minnow contained in the U.S. EPA criteria.[238] Although such use of an ACR of 20.7 conflicts

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[236] Engle 2010a.

[237] Foe, C., A. Ballard, and S. Fong. 2010. Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta. Central Valley Regional Water Quality Control Board, July 2010 (Foe et al. 2010).

[238] See U.S. EPA 1999.

with the U.S. EPA interpretation of fathead minnow data,[239] and although U.S. EPA does not use ACRs for single species to derive chronic criteria,[240] the hypothetical chronic criterion so derived was not exceeded by any of the ambient concentrations measured in the Regional Board study.

Despite the overwhelming evidence in the record that ammonia in the receiving water does not exceed acute and chronic criteria outside the District-requested mixing zones, the Permit reports an opinion expressed by Werner et al. (2008, 2009)[241] that repeated excursions of pH above 8.0 in the Delta may equate to a potential for chronic toxicity for delta smelt.[242] This gross generalization is not supported by co-occurring measurements of ambient pH and un-ionized ammonia in the Delta.[243] Because total ammonia concentrations and water temperature vary widely within pH strata across the estuary, ambient pH alone is an inappropriate basis for gauging whether un-ionized ammonia concentrations are of concern. For example, plots of pH versus un-ionized ammonia for both the brackish estuary and freshwater Delta for the years 2000-2010[244] indicate that un-ionized ammonia concentrations span the full range of ambient values (low to high) when pH is greater than 8.0.[245]

[239] U.S. EPA used the geometric mean of all three available ACRs (20.7, 9.7, 6.5) to characterize the acute:chronic sensitivity of fathead minnow (*Pimephales*), not the highest of the available ACRs (20.7). This was done because U.S. EPA considered the test that yielded the ACRs of 20.7 to be flawed. (See U.S. EPA 1999, pp. 53-54.) The resulting Genus Mean ACR (GMACR) for fathead minnow is 10.86.

[240] Five GMACRs for fish genera have survived vetting by U.S. EPA and were published in both the 1999 (see reference above) and 2009 (U.S. EPA, Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater. EPA-822-D-09-001. December 2009) U.S. EPA ammonia criteria documents (*Pimephales* - 10.86, *Catostomus* - <8.33, *Ictaluris* - 2.712, *Ictaluris* - 7.671, *Micropterus* - 7.688). All five GMACRs are used by U.S. EPA to derive the chronic ammonia criterion—not just the GMACR for fathead minnow.

[241] Werner et al. 2008; Werner et al. 2009.

[242] Permit, p. J-2.

[243] District's October 2010 Comments and Evidence Letter, p. 25; Engle Written Testimony, p. 4; see also Hearing Transcript, p. 188:13-25.

[244] Sacramento Regional County Sanitation District Comments on Draft Nutrient Concentration and Biological Effects in the Sacramento-San Joaquin Delta, Central Valley Regional Water Quality Control Board, May 2010. Letter submitted to Chris Foe, Central Valley Regional Water Quality Control Board, June 14, 2010 (SRCSD 2010).

[245] See Figure 2.

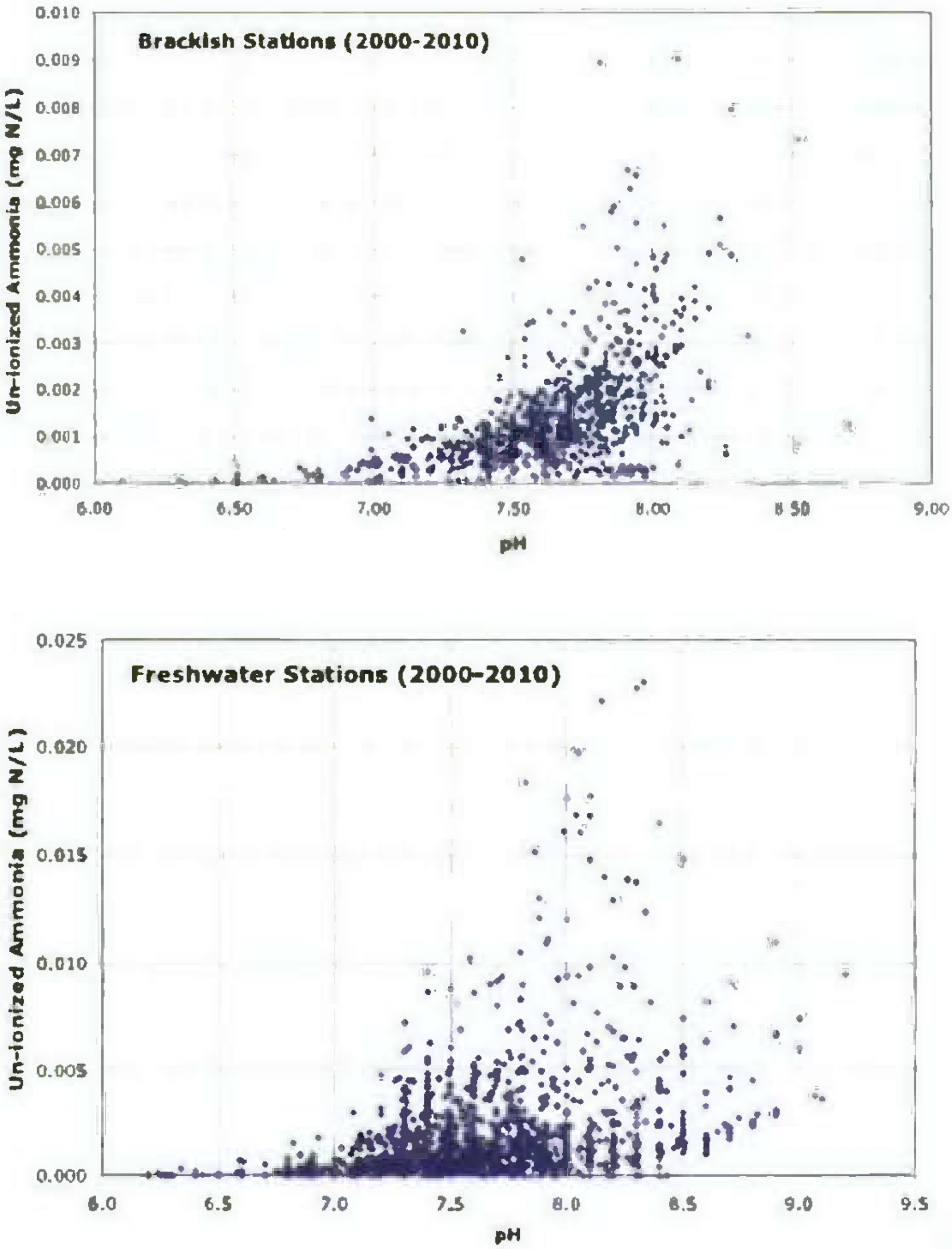

Figure 2. Relationship between field pH and un-ionized ammonia (mg N/L) at brackish stations (upper panel) (Sherman Island to San Pablo Bay) and at freshwater stations (lower panel) in the upper SFE during 2000-2010. Dataset is described in Engle & Lau 2010[246]. Data from 18 stations used by the IEP, DWR-MWQI (Municipal Water Quality Investigation), and UC Davis Aquatic Toxicology Lab POD project are represented. Figure is from SRCSD 2010.

[246] Engle, D.L., and G. Lau. 2010. Does Ammonia Exceed Toxicity Thresholds in the Upper San Francisco Estuary? A Comparison of Ambient Data and Toxicity Thresholds for 1974-2010. Interagency Ecological Program (IEP) Annual Workshop, Sacramento, CA (Engle & Lau 2010).

In any case, all of the un-ionized ammonia concentrations in the dataset, even those for pH>8.0, are well below the 96 hour LC10s[247] for 47-day old delta smelt (0.084, 0.105 mg N/L un-ionized ammonia).[248] Thus, the reference in Attachment J of the Permit to the suggestions that ammonia from the SRWTP may be causing chronic toxicity to delta smelt and other Delta fish is not supported by the evidence.[249]

b. The Permit Findings Regarding Acute and/or Chronic Toxicity to Delta Copepods (*Eurytemora affinis* and *Pseudodiaptomus forbesi*) Are Based on Preliminary and Questionable Study Results That Do Not Constitute Appropriate Water Quality Criteria

Although the Permit acknowledges that the evidence indicates ammonia is not causing acute and/or chronic toxicity to delta smelt and similar species, the Permit refers to new studies to claim that U.S. EPA's recommended ammonia criteria may not be protective of other Delta species.[250] Separate water quality criteria for these Delta species (*Eurytemora affinis* (*E. affinis*) and *Pseudodiaptomus forbesi (P. forbesi)*) do not currently exist. In the absence of such criteria, the Permit relies heavily on preliminary studies conducted by Dr. Swee Teh to find that ammonia in the effluent is causing acute and/or chronic toxicity to Delta copepods.[251] However, the results in Dr. Teh's studies are questionable when compared to environmentally representative conditions. The use of various effect levels from these preliminary studies would be an improper interpretation of the narrative toxicity water quality objective. Further, the preliminary results are in part improper evidence that was objected to during the Regional Board's hearing and should not have been considered.[252]

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[247] LC10 is the concentration at which it is estimated there is 10 percent mortality.

[248] Werner et al. 2009.

[249] Ultimately, the Permit findings do not express concurrence with this suggestion. (See Permit, p. J-2.) It is in any event erroneous, as discussed above.

[250] Permit, p. J-2.

[251] Permit, pp. J-2 to J-3.

[252] See section VI.B.1.b.iv, *post*.

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i. The Permit Relies on a Sub-Set of Study Results That Uses Misrepresentative pH

The Permit states that Sacramento River water below the discharge contains ammonium concentrations that can cause acute toxicity to either *E. affinis and P. forbesi* based on test results from Teh et al. 2009.[253] Relying on Teh et al. 2009, the Permit references that ten percent mortality occurred to both *E. affinis* and *P. forbesi* at ambient concentrations present in the river below the SRWTP.[254] However, this statement and the associated reliance on Teh et al. 2009 are contrary to previous Regional Board staff interpretations of the same test results. In reviewing the test results, Dr. Chris Foe noted that the test pH associated with toxicity in Dr. Teh's experiments (i.e., 7.2) was not representative of ambient pH levels in the Sacramento River.[255] In a technical memorandum to the Regional Board, Dr. Foe states that:

> Ten percent mortality occurred to both species at ambient ammonia concentrations present in the river below the SRWTP. *However, toxicity was only observed at a lower pH (7.2) than commonly occurs in the River (7.4 to 7.8).* Toxicity was not observed when toxicity testing was done at higher pH levels.[256]

When environmentally representative pH is considered, test results involving *E. affinis* and *P. forbesi* do not indicate a potential for acute toxicity in the Sacramento River or the Delta. The LC10s for *E. affinis* and *P. forbesi* at the most environmentally relevant test pH (pH 7.6) are about 5 mg N/L total ammonia.[257] This concentration (5 mg N/L) is more than five times higher than the maximum concentrations observed in the Sacramento River during 16 field surveys conducted by the Regional Board from 2009-2010.[258] Further, the LC10s are higher than the

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[253] Permit, pp. F-56, J-2; Teh, S., S. Lesmeister, I. Flores, M. Kawaguchi, and C. Teh. 2009. *Acute Toxicity of Ammonia, Copper, and Pesticides to Eurytemora affinis and Pseudodiaptomus forbesi*. Central Valley Regional Water Quality Control Board Ammonia Summit, Sacramento, California, August 18-19, 2009 (Teh et al. 2009).

[254] Permit, p. J-2.

[255] Foe, C. 2009. *August 2009 Ammonia Summit Summary*. Technical Memo to Jerry Bruns and Sue McConnell, Central Valley Regional Water Quality Control Board, September 24, 2009 (Foe 2009).

[256] Foe 2009, p. 2, emphasis added.

[257] LC10s in Teh et al. (2009) were 5.02 and 5.16 mg N/L total ammonia for *E. affinis* and *P. forbesi*, respectively.

[258] Foe et al. 2010.

99.91 percentile of ammonia concentrations occurring 350 feet below the SRWTP diffuser.[259] In other words, ambient concentrations of total ammonia in the Sacramento River essentially never exceed the lowest acute thresholds (LC10s) thus far reported for *E. affinis* or *P. forbesi* for representative pH conditions.

With respect to the rest of the Delta, there is also no relevant evidence supporting a claim of acute toxicity for *E. affinis* or *P. forbesi*. None of the ambient total ammonia values measured by the Regional Board at 24 sites throughout the Delta exceeded the environmentally relevant LC10s for these two copepod species during 16 field surveys conducted 2009-2010, and most ambient concentrations were more than an order of magnitude lower than the LC10s.[260] When expressed as *un-ionized* ammonia, the environmentally relevant LC10s for the two copepod species (0.08 mg N/L un-ionized ammonia for both species at pH 7.6)[261] are well above the 99th percentile (i.e., 0.014 mg N/L un-ionized ammonia) of measured ambient concentrations of for the freshwater Delta for 2000-2010.[262] None of the Regional Board's measurements of total ammonia in the Delta during 2009-2010[263] exceeded the preliminary 96-hour Lowest Observed Effects Concentration (LOEC) for 3-day old nauplii of *P. forbesi* (1.23 mg N/L total ammonia) reported in a November 10, 2010, letter from Dr. Teh to Dr. Foe referenced in the Permit.[264] Only one of the ambient un-ionized ammonia measurements in the more extensive dataset illustrated in Figure 3 exceeds the nauplii LOEC when it too is expressed as un-ionized ammonia (0.03 mg N/L un-ionized ammonia at reported test conditions of pH 7.8 and temperature 20°C). Thus, when acute effects thresholds for environmentally representative pH values are compared to ambient

[259] Anti-Degradation Analysis for Proposed Discharge Modification to the Sacramento Regional Wastewater Treatment Plant, Draft, Larry Walker Associates (May 20, 2009) (Expansion ADA).

[260] Foe et al. 2010.

[261] Teh et al. 2009.

[262] See also Figure 3; Teh et al. 2009.

[263] Foe et al. 2010.

[264] Permit, p. J-3; see also section VI.B.1.b.iv, *post* (referenced letter was objected to and should be stricken from the record).

ammonia concentrations in the Delta, there is no evidence of acute toxicity to the most sensitive Delta species.[265]

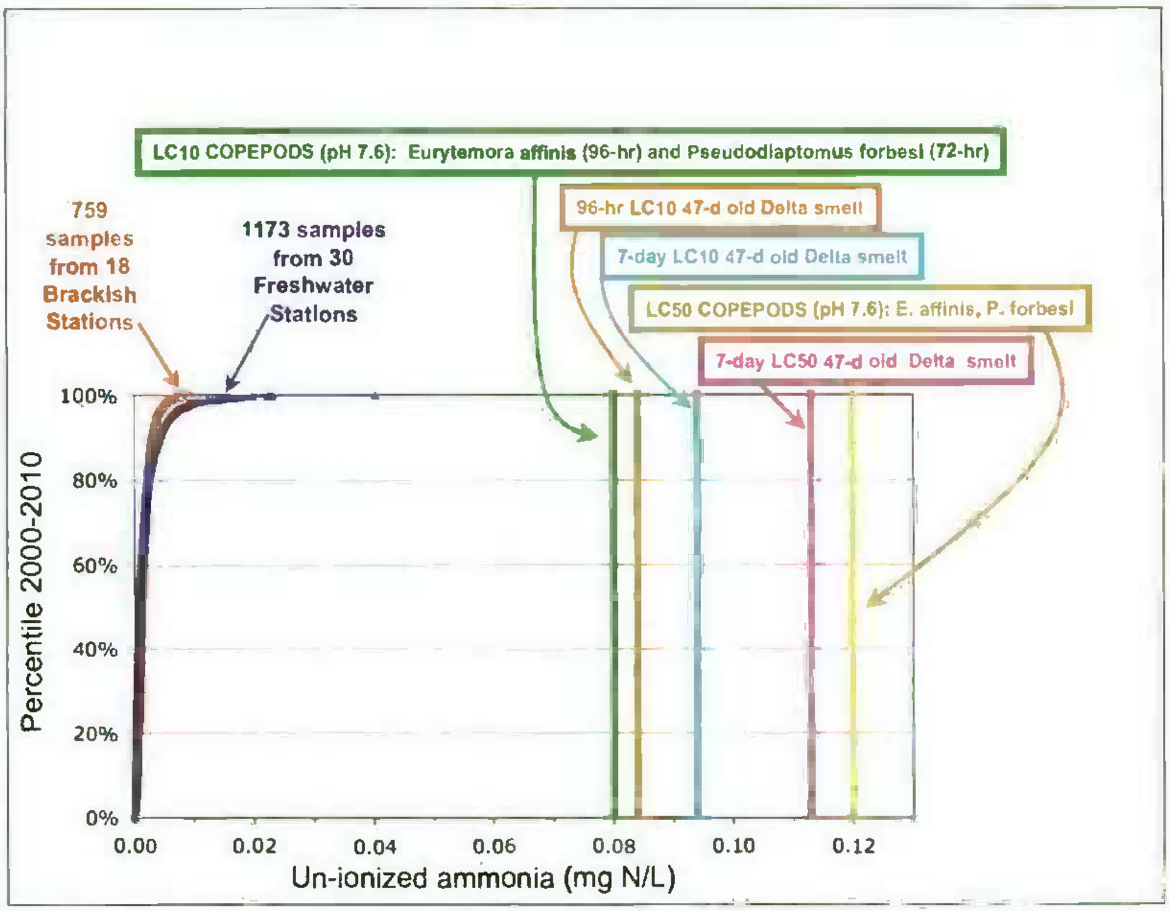

Figure 3. Ranked distribution of ambient concentrations of un-ionized ammonia from estuarine stations (red circles) and freshwater stations (blue triangles) in the upper SFE for 2000-2010. Monitoring stations are illustrated in Figure 1. Included are acute effects thresholds for un-ionized ammonia from exposure tests using delta smelt and the adult copepods *E. affinis* and *P. forbesi*. A preliminary 96-hour LOEC for juvenile *P. forbesi* (3-day-old nauplii, reported in Nov. 2010 (1.23 mg/L as total ammonia-N), not illustrated in the figure, equates to 0.03 mg N/L un-ionized ammonia at the reported test conditions (pH 7.8, 20°C).[266] Figure is adapted from Engle 2010a.[267]

[265] District's October 2010 Comments and Evidence Letter, p. 37; Engle Written Testimony, p. 4; Hearing Transcript, p. 188:6-12.

[266] Permit, J-7.

[267] Figure 3 in Engle 2010a was adapted by adding the LC10 and LC50 for *P. forbesi* from Teh et al. 2009.

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ii. The Permit's Findings of Chronic Toxicity to Delta Copepods Are Based on Improper ACR Analysis and Preliminary Information

To find chronic toxicity to Delta copepods, the Permit relies on an ACR analysis and preliminary test results from Teh et al. 2009 and Teh et al. 2010, respectively.[268] With respect to the ACR approach, Dr. Teh used test results with a pH of 7.2 to calculate a hypothetical chronic criterion for the two copepod species.[269] However, as discussed above and further explained in Engle 2010b,[270] use of the lowest test pH biased the analysis. When the LC50s from exposures at *environmentally relevant* test pH (7.6)[271] are used in an analogous ACR analysis, the resulting hypothetical chronic criteria for the two copepod species are exceeded in only 4 out of 2,487 measurements of un-ionized ammonia from the upper SFE during the last decade.[272]

Using Dr. Teh's preliminary test results from an oral presentation (Teh et al. 2010) and an informal letter exchanged between the investigator and Regional Board staff in November 2010 (a month after the deadline for written comments on the September Tentative Permit),[273] the Permit finds *P. forbesi* affected by ammonia concentrations ≥0.36 mg/L.[274] The use of this preliminary effects threshold to find chronic toxicity is technically inappropriate for several reasons:

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[268] Permit, p. J-2; Teh, S., I. Flores, M. Kawaguchi, S. Lesmeister, and C. Teh. 2010. Full life-cycle bioassay approach to assess chronic exposure of *Pseudodiaptomus forbesi* to ammonia/ammonium. Oral presentation given to POD Contaminant Workteam, July 2010 (Teh et al. 2010).

[269] Teh et al. 2009. LC50s from his lowest test pH (7.2) were divided by an arithmetic mean of GMACRs for fish daphnids from U.S. EPA 1999.

[270] Engle, D. 2010b. Memorandum: Comments Regarding the Regional Board Staff Analysis of the 2009 Ammonia Summit. 20 p. January 13, 2010 (Engle 2010b).

[271] Based on IEP, USGS, and DWR monitoring data for the period 2000-2010, the median and mean pH for the brackish delta are 7.6 and 7.7, respectively, and the median and mean pH for the freshwater Delta are both 7.6. (Engle 2010b.)

[272] See Engle 2010b; Permit, p. J-2.

[273] November 10, 2010, letter from Dr. Swee Teh, University of California, Davis, to Dr. Chris Foe, RWQCB (November Teh Letter); see Permit, p. J-3.

[274] Permit, p. F-56.

- The test result concentration (0.36 mg/L total ammonia) does not represent an EC20[275] for the species. EC20s are the thresholds used by the U.S. EPA 1999 and 2009 for derivation of the chronic ammonia criterion.[276]
- The concentration referenced in the Permit (0.36 mg/L total ammonia) is from recent laboratory work that has not been written up in a report or manuscript for stakeholder or peer review.
- There are irregularities in the test results, which have not been explained. An inverse relationship was observed between toxicity and test pH, which is opposite from the expected responses for organisms included in the U.S. EPA ammonia database. A dose-response was not observed in the chronic test based on the number of nauplii surviving to adulthood.
- The tests were conducted with a novel test organism (a copepod species), for which there are no established protocols and no comparable test results from other laboratories.[277]

Considering the preliminary nature of the information, lack of review, and irregularities in test results, the 0.36 mg/L value is inappropriate for determining if ambient ammonia at this level causes chronic toxicity to copepods.

iii. Effect Levels From Preliminary Studies Are Inappropriate Water Quality Criteria

At the center of the Regional Board's finding here (i.e., acute and/or chronic toxicity to *P. forbesi*) is that, based on Dr. Teh's work, ammonia concentrations lower than criteria calculated from U.S. EPA ammonia criteria can have adverse effects. However, the use of effect

[275] The EC20 is a calculated effect level indicating the concentration of a parameter causing a 20 percent reduction in a measured effect compared to the control or reference condition. The measured effect is typically sublethal, such as reproduction (compared to lethality, which is the basis for LCx thresholds, such as LC50s). The EC20 is calculated using a regression model based on multiple test concentrations of the parameter, and is statistically more robust than hypothesis testing endpoints (such as the NOEC or LOEC).

[276] U.S. EPA 1999; U.S. EPA. 2009. Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia-Freshwater. EPA 822-D-09-001. United States Environmental Protection Agency, December 2009 (U.S. EPA 2009).

[277] District's October 2010 Comments and Evidence Letter, p. 38; Engle Written Testimony, p. 4.

levels from Dr. Teh's preliminary studies are unlawful under state and federal regulations for interpreting narrative criteria.

As discussed in section VI.A.2 above, when establishing effluent limitations due to a finding that the effluent has reasonable potential to violate a narrative criteria (i.e., toxicity), as was done here, the Regional Board must use a calculated numeric water quality criteria derived from, ". . . a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant form the Food and Drug Administration, and current EPA criteria documents; . . . ."[278] The effects levels identified in Dr. Teh's preliminary studies are not proposed state criteria, thus the Regional Board must rely on a regulation that allows for the interpretation of narrative objectives.

With respect to interpreting narrative objectives pursuant to an explicit state policy or regulation, the Basin Plan includes a policy that requires the Regional Board to consider, ". . . on a case-by-case basis, direct evidence of beneficial use impacts, all material and relevant information submitted by the discharger and other interested parties, and relevant numerical criteria and guidelines developed and/or published by other agencies and organizations . . . ."[279] The Basin Plan further provides that, "[i]n considering such criteria, the Board evaluates whether the specific numerical criteria, which are available through these sources and through other information supplied to the Board, are relevant and appropriate to the situation at hand and, therefore, should be used in determining compliance with the narrative objective."[280]

Here, the use of Dr. Teh's results does not comply with the Regional Board's policy for several reasons. First, as indicated above, Dr. Teh's results are from preliminary studies that are not yet published.[281] Second, the Regional Board has failed to conduct and document a case-by-

[278] 40 C.F.R. § 122.44(d)(1)(vi)(A).

[279] Basin Plan, p. IV-17.00.

[280] Basin Plan, p. IV-17.00.

[281] Hearing Transcript, pp. 192:20-193:5; 194:12-14; SRCSD Hearing Exhibits, PowerPoint slide 19; Teh et al. 2010.

case analysis to determine if the effects levels identified in Dr. Teh's studies are relevant and appropriate. For example, Attachment J of the Permit references Teh et al. 2009 in its discussion regarding acute ammonia toxicity but does not evaluate or discuss why these results are appropriate for interpreting the narrative toxicity water quality objective.[282] Had such an analysis occurred, the Regional Board should have found that the use of these results were not appropriate or relevant because the test pH associated with toxicity was not representative of ambient pH levels in the Sacramento River.[283]

Likewise, the results from Teh et al. 2009 and Teh et al. 2010, which were used to find chronic toxicity, are preliminary and unpublished, and no case-by-case evaluation was conducted to determine their applicability and relevance for interpreting narrative criteria and establishing effluent limitations.[284] Attachment J of the Permit summarizes Dr. Teh's preliminary results but does not explain why their application is relevant and appropriate here.[285] Had the Regional Board conducted the proper analysis, it should have found that the results are not appropriate at this time because: the test result concentration does not use an appropriate U.S. EPA threshold for deriving chronic criteria; the results are unpublished; there were unexplained irregularities in the test results; and, there are no established protocols for conducting such tests on copepods.[286] However, the Permit record is void of any such analysis except for statements made by Regional Board staff that they have reviewed the data.[287] Reviewing the data and putting material in the record does not constitute a case-by-case analysis of relevance and applicability.

Further, even if the preliminary work was a proper basis for implementing the narrative toxicity objective, the Permit fails to provide any logical connection between the adopted final limits and pseudo-water quality criteria used from Dr. Teh's preliminary studies.[288] Dr. Teh

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[282] Permit, p. J-2.

[283] See section VI.B.1.b.i, *supra*.

[284] See sections VI.B.1.b.ii, iii, *supra*.

[285] Permit, p. J-2.

[286] See sections VI.B.1.b.ii, iii, *supra*.

[287] Hearing Transcript, p. 411:4-6.

[288] See Permit, p. F-56.

identified a chronic effect level as ≥0.36 mg N/L. The Permit contains final limits calculated from the U.S. EPA ammonia criteria without consideration of dilution. There is no rationale or explanation in the Permit that connects the final limits with Teh's effect level. Further, during the Permit hearing, Regional Board staff effectively acknowledged that the specific final limits were actually unrelated to the reason for their adoption.[289]

Considering the lack of any case-by-case analysis and any connection between the calculated effluent limitations and Dr. Teh's pseudo criteria, the Regional Board failed to comply with state and federal regulations. Thus, the Regional Board's findings with respect to acute and/or chronic toxicity to copepods relying on work by Dr. Teh to interpret the narrative toxicity objective, and ultimately deny assimilative capacity, were arbitrary and capricious and must be voided.

iv. The State Board Should Strike Objected-To Hearsay Evidence That Was the Basis of a Finding, and the Finding Relying on That Hearsay Evidence

At the Regional Board hearing, the District objected to certain evidence that is the exclusive basis for certain findings in the Permit.[290] The objection was overruled.[291] For the reasons provided below, the State Board should determine that it was error to overrule the objection, strike the evidence, and strike the finding based exclusively on hearsay.[292]

As discussed herein, various hypotheses have evolved concerning effects of ammonia on the aquatic ecosystem. One of these, as characterized in the Permit and discussed above, is based on a "preliminary testing" completed by Dr. Teh who "reported at 6 July 2010 IEP Contaminant Work Team meeting that *P. forbesi* reproduction and survival was negatively effected [sic] by ammonia concentrations as low as 0.36 mg N/L."[293] This statement also appeared in the

[289] Hearing Transcript, p. 197:14-17 (". . . some of the staff think that the effluent limits that are in your tentative permit are the right limits for the wrong reason.").

[290] Permit, p. F-57.

[291] Hearing Transcript, pp. 406:8-407:20.

[292] The District lodged various other objections at the hearing, and all were overruled. The District takes exception to all such rulings. At the present time, it does not appear that other matters objected to became a specific basis for Permit terms or findings. However, to the extent it may become relevant, the District may wish to provide further argument in regard to such objections.

[293] Permit, p. J-2.

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September Tentative Permit and the District provided comment and evidence regarding this statement.[294]

The September Tentative Permit also contained the statement that "Dr. Teh plans additional experiments to confirm the *P. forbesi* findings and to attempt to establish NOECs and LOECs."[295] This text was, however, dramatically modified in the November Tentative Permit and Permit as adopted. In particular, the reference to planned future studies was changed to say that Dr. Teh "completed" additional experiments and "confirmed" his findings that were purportedly reported in July, and goes on, in three additional sentences, to describe what Dr. Teh concluded.[296] The sole authority cited is "November 10, 2010 letter from Dr. Swee Teh, University of California, Davis to Dr. Chris Foe, CVRWQCB."[297] The November Teh Letter states that its purpose is to report results on additional studies and describes various results.[298] The November Teh Letter also states that Dr. Teh will prepare a draft final report and subsequent report.[299]

Government Code section 11513(d) provides: "Hearsay evidence may be used for the purpose of supplementing or explaining other evidence but over timely objection shall not be sufficient in itself to support a finding unless it would be admissible over objection in civil actions." The November Teh Letter is cited as the sole basis for what "additional experiments"

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[294] September Tentative Permit, p. K-3; see, e.g., District's October 2010 Comments and Evidence Letter, p. 38.

[295] September Tentative Permit, p. K-3.

[296] See November Redline Tentative Permit, p. J-3. The full text as revised, and the text which should be stricken based on the District's objection, is as follows:

> Dr. Teh completed additional experiments and confirmed the *P. forbesi* findings. Dr. Teh concluded *P. forbesi* is more sensitive to total ammonia nitrogen at lower pH and the ionized fraction is more toxic than unionized fraction of ammonia to *P. forbesi*. The Low Observed Effect Concentration (LOEC) of 0.36 mg/L from chronic 31-day study indicated total ammonia at environmentally relevant concentrations of 0.3 to 0.6 mg/L as seen in the Cache Slough regions may pose significant effect on the survival and population of *P. forbesi*. Reproduction performance, i.e., time for female to be gravid and surviving of newborn to the juvenile stages, of *P. forbesi* is affected by ammonia at concentration $\geq$ 0.36 mg/L. (November Redline Tentative Permit, p. J-3; Permit, p. J-3.)

[297] November Redline Tentative Permit, p. J-3; Permit, p. J-3; November Teh Letter.

[298] November Teh Letter, p. 1.

[299] November Teh Letter, p. 4.

purportedly show, and the Permit relates the content of the letter as findings.[300] This is classic hearsay and improper. The Regional Board should not have considered this evidence in adopting the Permit.

Hearsay evidence is "evidence of a statement that was made other than by a witness while testifying at the hearing and that is offered to prove the truth of the matter stated."[301]

At the hearing, the District objected to the November Teh Letter on the grounds of basic fairness of process, and because the letter is hearsay.[302] The District also objected to "the text of the appendix that simply recites what the letter says as being fact."[303] The District pointed out that the letter was cited for specific Permit findings.[304] Inefficient discussion then proceeded on the subject of whether the November Teh Letter was merely corroborative of non-hearsay (or, in the language of the statute, whether it supplements or explains other evidence). The letter is *not* corroborative of non-hearsay. Staff asserted that the letter confirmed the July information, but the issue properly is what the "additional experiments" described in the November letter themselves amount to.[305] Staff also stated that he had "looked at the test methods," which is not the question, and had "reviewed the actual data."[306] Whatever data this may be, and assuming representations were somehow being made about what the data show, this too is hearsay. There was no non-hearsay evidence as to the content of the findings of the recent work. For that matter, the July information is hearsay as well. Beyond that, it remains true that parties were deprived of any realistic opportunity to address the information in the November Teh Letter.

Accordingly, the State Board should strike the November Teh Letter, Finding 6 on page F-56 of the Permit, and the first four full sentences on page J-3 of the Permit.

The District believes it important to emphasize certain points. First, the issue addressed

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[300] Permit, p. F-56.

[301] Evid. Code, § 1200(a).

[302] Hearing Transcript, pp. 406:8-407:5, 407:16-18.

[303] Hearing Transcript, p. 407:18-20.

[304] Hearing Transcript, p. 409:2-7.

[305] See Hearing Transcript, pp. 409:2-411:1.

[306] Hearing Transcript, p. 411:4-6.

above is by no means the only deficiency in the Permit's Appendix J, and its findings in the Fact Sheet based on information in Appendix J. Second, the District does not consider the improper evidence to be a smoking gun or simply seek to bury evidence that is somehow "problematic." The District has addressed the relevant technical issues above. However, the evidence is simply improper and symptomatic of a rush to judgment based on preliminary work that is entirely inappropriate.

c. Findings Regarding Inhibition of Diatom Primary Production Are Not Supported by the Evidence in the Record

In addition to using Dr. Teh's preliminary results to find acute and/or chronic toxicity, the Regional Board also discusses information with respect to inhibition of diatom primary production caused, in part, by ammonia inhibition to find that ammonia may be affecting aquatic life beneficial uses.[307] The Regional Board used this information as a reason to deny acute and/or chronic mixing zones and to support the adopted final effluents for ammonia.[308] However, the Permit findings with respect to ammonia inhibition of nitrate uptake are not supported by evidence in the record; not proper interpretations of applicable water quality objectives; unrelated to acute and/or chronic mixing zones; and unrelated to the final adopted effluent limitations.[309]

The Permit proposes that one of the hypotheses for the POD is low primary production rates or low chlorophyll levels in the Delta.[310] The Permit identifies three hypothesized factors that may be causing low primary production rates in Suisun Bay of which only one, ammonia inhibition of nitrate uptake by diatoms, could possibly be alleged to be connected to effluent discharges from the SRWTP.[311] The other two factors, depletion due to filtration by clams and high turbidity, are unrelated to SRWTP discharges.[312] In any case, the three factors are hypotheses, and the Permit and Permit record do not include convincing evidence to show that

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[307] Permit, p. J-5.

[308] Permit, pp. F-55 to F-56.

[309] Permit, p. F-55, Findings 3-5.

[310] Permit, p. J-5.

[311] Permit, p. J-5.

[312] Permit, p. J-5.

ammonia inhibition is a factor affecting aquatic life beneficial uses, or that ammonia reduction in the SRWTP effluent to the levels required by the Permit would actually increase diatom biomass in Suisun Bay.[313]

For example, the Permit provides no direct evidence regarding how often the alleged impact occurs, for how long, why it is a problem, how it affects the food web, or whether it affects fish species—all information necessary to show how ammonia inhibition might impair aquatic life beneficial uses. Further, due to the overwhelming and well-documented impact of benthic grazing by the invasive clam *Corbula amurensis* on phytoplankton biomass during the summer and fall in Suisun Bay (Alpine & Cloern 1992, Jassby et al. 2002, Kimmerer 2005, Thompson 2000),[314] tremendous uncertainty exists as to whether the upper SFE would experience a return of historic summer-fall phytoplankton biomass in the brackish Delta if the estuary remains colonized by *Corbula*—regardless of other physical or chemical changes that may occur.[315]

Currently, the hypothesized potential for increased diatom biomass in Suisan Bay related to ammonia reduction is logically constrained to the April-May window when lower benthic grazing rates (claim grazing), increased water temperature, density stratification, and other factors occasionally provide windows for bloom development. However, historical evidence indicates that the spring period (April-May) was not when the bulk of annual phytoplankton biomass occurred in Suisun Bay.[316] Instead, prior to the arrival of the clam in 1987, June-September were

[313] See District's October 2010 Comments and Evidence Letter, pp. 25-26; Engle Written Testimony, p. 4.

[314] Alpine, A.E., and J.E. Cloern. 1992. Trophic interactions and direct physical effects control phytoplankton biomass and production in an estuary. Limnol. Oceanogr. 37:946-955 (Alpine & Cloern 1992).

Jassby, A.D., J.E. Cloern, B.E. Cole. 2002. Annual primary production: patterns and mechanisms of change in a nutrientrich tidal estuary. Limnol Oceanogr 47:698-712 (Jassby et al. 2002).

Kimmerer, W.J. 2005. Long-term changes in apparent uptake of silica in the San Francisco estuary. Limnol Oceanogr 50:793-798 (Kimmerer 2005).

Thompson, J.K. 2000. Two stories of phytoplankton control by bivalves in San Francisco Bay: the importance of spatial and temporal distribution of bivalves. J Shellfish Res 19:612 (Thompson 2000).

[315] District's October 2010 Comments and Evidence Letter, p. 25; Engle Written Testimony, p. 4.

[316] SRCSD 2010.

the months of highest mean phytoplankton biomass in Suisun Bay and the confluence zone.[317] Thus, even if ammonium reductions led to more frequent spring blooms in Suisun Bay—grazing by *Corbula* during summer and fall months would still prevent a recovery of annual algal biomass to levels that occurred historically in Suisun Bay in the 1970s and early 1980s.

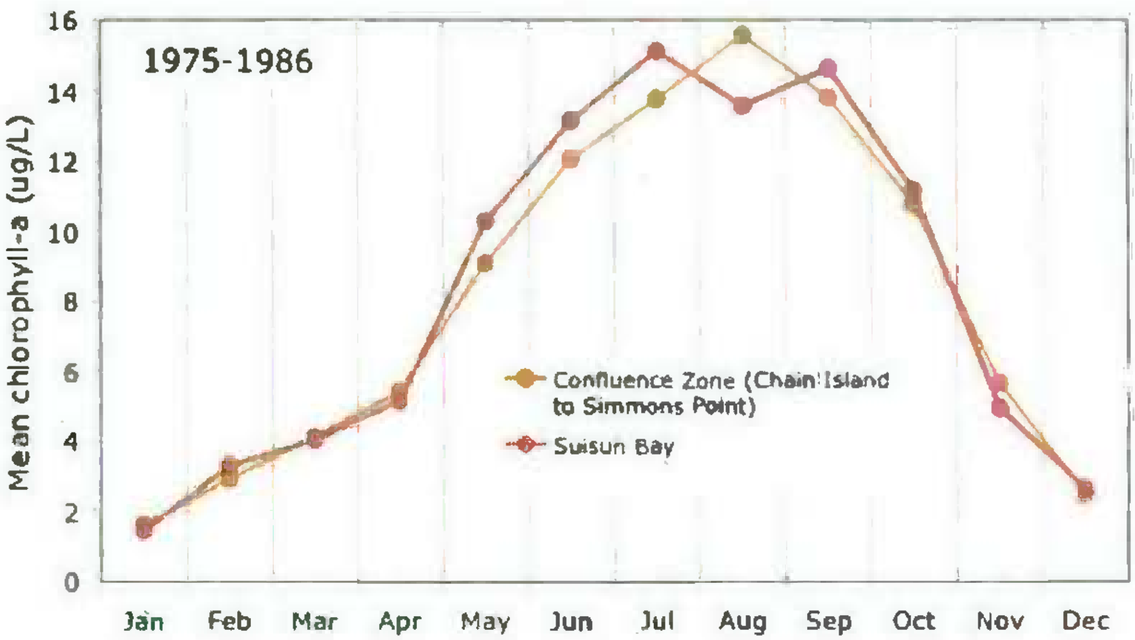

Figure 4. Mean monthly chlorophyll-a concentrations from surface (0-2 m) water samples collected between 1975-1986 at stations used by the IEP, DWR-MWQI, and the USGS. The bulk of annual phytoplankton biomass historically occurred during the same months (June-October) during which *C. amurensis* currently controls phytoplankton biomass in the brackish estuary. Figure is from SRCSD 2010.[318]

Further, the Permit overstates the evidence provided by field surveys in Suisun Bay. The Permit relies on Wilkerson et al. 2006[319] and Dugdale et al. 2007[320] to state that "[a]mmonia-induced inhibition of nitrate uptake prevents spring algal blooms from developing when conditions are otherwise favorable."[321] However, no time series data are presented in either

[317] See Figure 4.

[318] SRCSD 2010.

[319] Wilkerson, F.P., R.C. Dugdale, V. Hogue, and A. Marchi. 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. Estuaries and Coasts 29(3):401-416 (Wilkerson et al. 2006).

[320] Dugdale, R.C., F.P. Wilkerson, V.E. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring bloom development in San Francisco Bay. Est. Coast. Shelf. Sci. 73:17-29 (Dugdale et al. 2007).

[321] Permit, p. J-5.

publication regarding several environmental parameters (e.g., stratification, benthic grazing by clams, zooplankton abundance, residence time, Delta outflow), which are important to the determination of whether conditions are "favorable" for blooms.[322] In the time series presented in Wilkerson et al. 2006 and Dugdale et al. 2007, algal blooms occurred in Suisun Bay only twice out of five periods when ammonium concentrations fell below 4 μM,[323] and one of the blooms (Spring 2003) failed to yield chlorophyll-a levels above 10 μg/L—a level commonly referenced as a threshold for nutritional adequacy for Delta zooplankton.

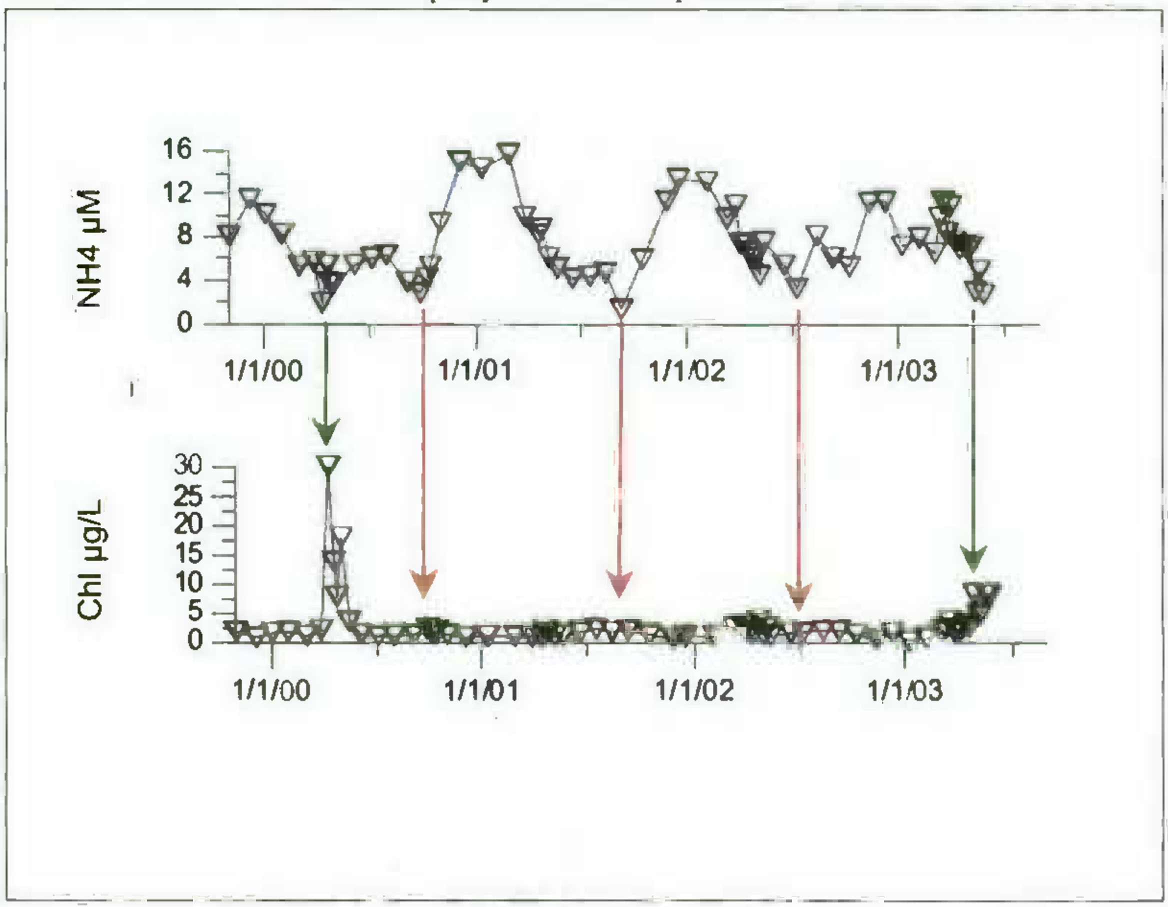

Figure 5. Time series of ammonium and chlorophyll-a from Suisun Bay. Green arrows indicate where ammonium concentrations below a 4 μM threshold were accompanied by increases in chlorophyll-a. Red arrows show periods when similarly low ammonium concentrations were not accompanied by increases in chlorophyll-a. Panels are from Figure 1 in Dugdale et al. 2007; identical time series presented in Wilkerson et al. 2006. Figure is from SRCSD 2010.[324]

[322] District's October 2010 Comments and Evidence Letter, p. 26; Engle Written Testimony, p. 4.

[323] See Figure 5.

[324] SRCSD 2010.

This pattern amply illustrates that other factors frequently prevent blooms in Suisun Bay, even when ammonium concentrations are below the "Dugdale threshold" of 4 μM.[325] In fact, with the documentation of drawdown of ammonium during the onset of blooms by Wilkerson et al. 2006,[326] time series limited to measurements of ammonium and chlorophyll-a cannot rule out the possibility that low ammonium concentrations *in situ* are the *result* of a bloom triggered by non-nutrient factors, rather than the *cause*.

The same methodological shortcomings apply to the recent fieldwork funded by the San Francisco Regional Board, in which ammonia and chlorophyll-a were purportedly measured about twice per month during the spring/summer of 2010.[327] The Permit mentions the project, but no related documentation is publicly available.[328] The interpretation of field data for ammonia and chlorophyll-a collected on such a coarse time scale fails to rule out the possibility that other environmental factors initiate blooms in Suisun Bay—and that low ammonium concentrations are a result of the blooms (not a requirement for them).

The Permit references a number of different studies respecting theories that ammonium inhibition and shifts in algal communities caused by ammonia are causes of the POD and necessitate the Permit limits resulting in full nitrification of the effluent.[329] However, as shown below, reliance on the studies identified is misplaced and there exists significant evidence that contradicts the theories espoused in the Permit.

i. The Evidence in the Record Fails to Support Findings That Ammonia Is Responsible for Decreases in Chlorophyll-a and Changes the Phytoplankton Composition Downstream From the SRWTP

Many predictions based on the ammonium-inhibition theory (and other ammonia/algae hypotheses) have been contradicted by results from recent studies funded by DWR, CalFed,

[325] District's October 2010 Comments and Evidence Letter, p. 26; Engle Written Testimony, p. 4.

[326] Wilkerson et al. 2006.

[327] Permit, p. J-5; District's October 2010 Comments and Evidence Letter, p. 26; Engle Written Testimony, p. 4.

[328] Permit, p. J-5.

[329] Permit, pp. J-1, J-5 to J-8.

Regional Board, and State Water Contractors. Unsubstantiated predictions include: (1) chlorophyll-a production would be lower and slower in river water below the discharge compared to above the discharge; (2) the SRWTP discharge would trigger a change in the relative biomass of large (e.g., diatoms) versus small phytoplankton in the Sacramento River; (3) biomass of phytoplankton would not increase in the river in reaches where ammonium uptake exceeded nitrate uptake; and (4) ammonia concentrations would explain the occurrence of *Microcystis*, a nuisance species. In addition, the Permit does not place ammonia-related hypotheses in context with other well-regarded hypotheses for recent changes in the biomass or composition of phytoplankton in the upper estuary.[330]

(a) Ammonia Concentrations Above the Threshold of 4 μM Have Been Shown to Stimulate Growth of N-Limited Phytoplankton as They Enter the Delta in the Sacramento River

Five-day "grow-out" experiments were conducted by Parker et al. 2010[331] using water collected above and below the SRWTP discharge in November 2008 and March and May 2009. The grow-out experiments were intended to eliminate light limitation, but by design also eliminate other environmental factors (e.g., settling and *in situ* grazing) that potentially affect riverine phytoplankton biomass in transport through the Delta.[332] During three out of four of the grow-out experiments, phytoplankton grew *better* in water collected at River Mile 44 below the SRWTP discharge than they did in Sacramento River water collected above the discharge, even though the ammonium concentrations at River Mile 44 were well above the Dugdale threshold of 4 μM.[333]

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[330] See Permit, pp. J-1 to J-8.

[331] Parker, A.E., A.M. Marchi, J. Davidson-Drexel, R.C. Dugdale, and F.P. Wilkerson. 2010. Effect of ammonium and wastewater effluent on riverine phytoplankton in the Sacramento River, CA. Final Report. Technical Report for the California State Water Resources Board, May 29, 2010 (Parker et al. 2010).

[332] District's October 2010 Comments and Evidence Letter, p. 27; Engle Written Testimony, p. 4.

[333] Ammonium concentrations in RM-44 water used in the grow-out experiments were: July 2008 - 9.06 μM; November 2008 - 71.87 μM; March 2009 - 12.47 μM; May 2009 - 9.54 μM (Table 19-22 in Parker et al. 2010); see Figure 6.

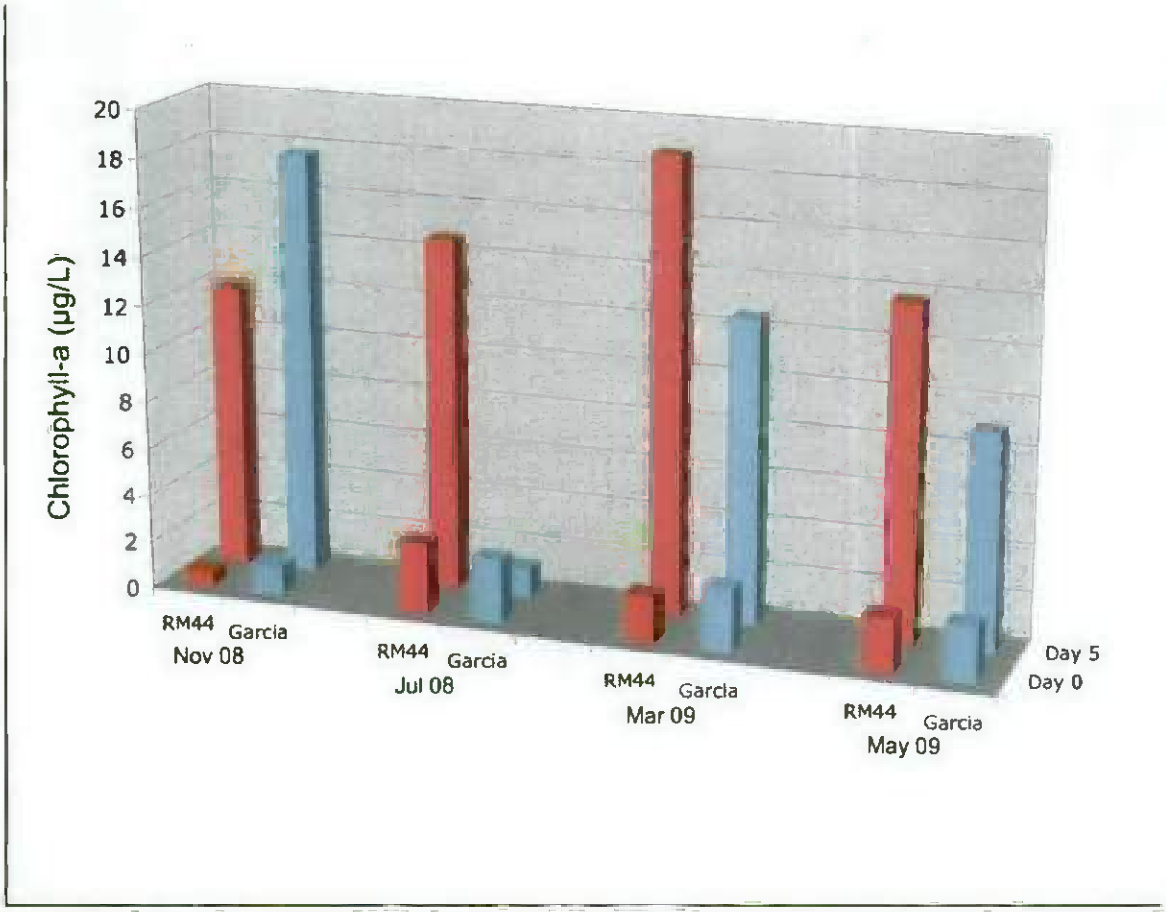

Figure 6. Results of 5-day grow-out experiments using water collected below the SRWTP discharge (RM-44, red bars) and above the SRWTP discharge (Garcia Bend, blue bars). In three out of four experiments (July 2008, March 2009, May 2009), phytoplankton biomass (chlorophyll-a) was higher after five days in water collected below the SRWTP discharge than in water collected above the discharge. Initial ammonium concentrations in RM-44 water used in the grow-out experiments were: July 2008 - 9.06 μM; November 2008 - 71.87 μM; March 2009 - 12.47 μM; May 2009 - 9.54 μM. Data are from Tables 19-21 in Parker et al. 2010.[334]

These results of the grow-out experiments led Parker et al. 2010 to paint a picture of *nitrogen-limited phytoplankton* upstream from the SRWTP, which potentially benefit from the ammonia introduced at the discharge.[335] Based on these results, little evidence exists to attribute downstream decreases in chlorophyll-a observed in some field surveys in the Sacramento River to

[334] Parker et al. 2010.

[335] See Parker et al. 2010, p. 26 ("Results from experimental grow-outs suggest that after removing light limitation phytoplankton bloom magnitude in the Sacramento River at RM-44 (downstream of SRWTP discharge) and GRC (upstream of SRWTP discharge) is likely determined by dissolved inorganic nitrogen (DIN) availability. Grow-out experiments conducted at RM-44 produced more chlorophyll-a than experimental grow-outs conducted at GRC. Phytoplankton appeared to take advantage of additional DIN, whether supplied as NO3 or NH4 in experiments conducted with water from GRC, or in the form of NH4 supplied in the wastewater effluent (at RM-44) to produce greater biomass.").

ammonium inhibition and suggest that it is more appropriate to consider loss factors (e.g., settling) that were nullified by the grow-out tests, but which operate *in situ*.[336]

(b) Longitudinal Studies of the Sacramento River Contradict Hypotheses That the SRWTP Discharge Causes a Decrease in Phytoplankton Biomass or Primary Production Rates, or That it Changes the Cell Size or Taxonomic Composition of Phytoplankton

Additionally, the Permit finds mixing zones should be denied based on far field impacts to aquatic life beneficial uses associated with hypothesized shifts in algal communities.[337] However, substantial evidence and information exists to suggest otherwise.[338] Specifically, multiple longitudinal transects, measuring nutrients and algal biomass in the Sacramento River from above Sacramento (I-80 bridge) to Suisun Bay, were conducted by Regional Board staff in 2008-2010.[339] Both studies revealed that although chlorophyll-a often declines in the downstream direction from the I-80 bridge above Sacramento to Rio Vista, no step decline is associated with the SRWTP discharge.[340] For example, in the data shown in Figure 7, more phytoplankton biomass (green line) was lost from river water *above* the SWRTP discharge than below. Further, most of the decline in diatoms (blue bars) occurred *upstream* of the SRWTP—a field result which directly contradicts the ammonium-inhibition hypothesis for the lower Sacramento River portion of the freshwater Delta.

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[336] District's October 2010 Comments and Evidence Letter, pp. 27-28; Engle Written Testimony, p. 4.

[337] Permit, pp. F-56, J-7.

[338] District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

[339] Foe et al. 2010, and Parker et al. 2009 and 2010.

[340] District's October 2010 Comments and Evidence Letter, p. 29; Engle Written Testimony, p. 4.

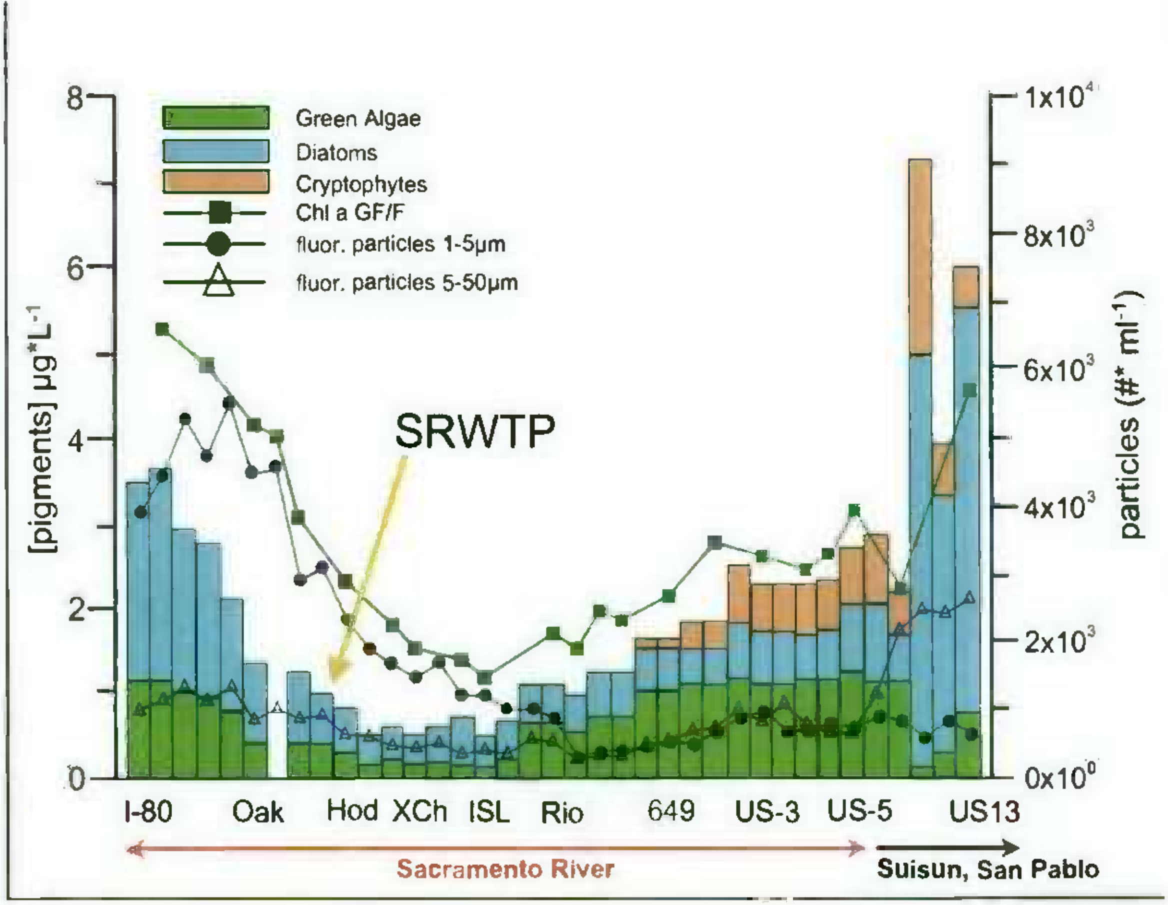

Figure 7. Longitudinal patterns in chlorophyll-a (green squares), biomass of major phytoplankton taxa (colored bars), concentration of small phytoplankton (black circles), and concentration of large phytoplankton (open triangles). Figure is from Engle 2010a.[341]

Analogous data from Parker et al. 2010 also contradict elements of the ammonium inhibition hypothesis and confirm that the location of the SRWTP discharge cannot explain patterns in phytoplankton biomass, cell size, or taxonomic composition in the Sacramento River. Figure 8 reveals that a downstream decrease in large phytoplankton (assumed by the investigators to be diatoms)—when it occurs—does not begin (nor does it accelerate) below the SRWTP discharge. Further, small phytoplankton do not increase in relative abundance below the SRWTP discharge. In other words, ammonium inputs at the SRWTP discharge do not control the relative abundance of large phytoplankton (presumed to be diatoms) and small phytoplankton. Thus, contrary to the Permit's findings, these field data directly contradict the hypothesis that ammonia will cause small phytoplankton to out-compete large (diatom) phytoplankton.[342]

[341] Parker et al. 2010 and Engle 2010a.

[342] See District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

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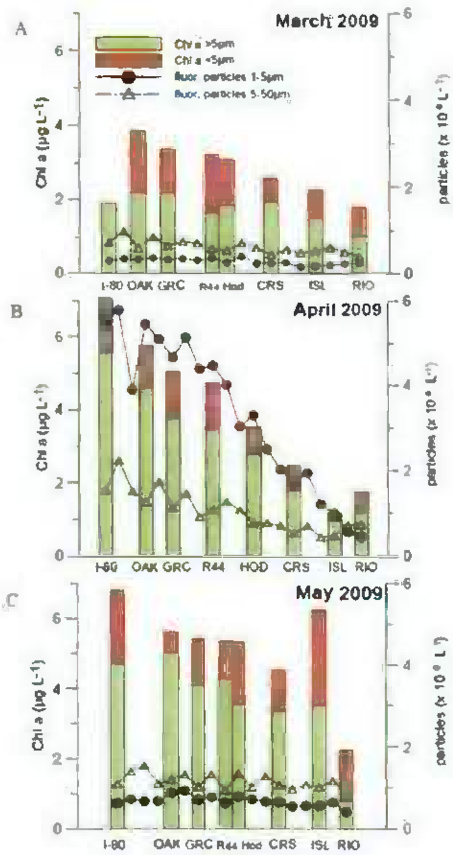

Figure 8. Longitudinal patterns in biomass of large phytoplankton (green bars and open triangles) and small phytoplankton (red bars and closed circles) in the Sacramento River between the I-80 Bridge and Rio Vista during Spring 2009. Large phytoplankton are presumed by the investigators to include most of the diatoms. Bars indicate biomass as chlorophyll-a. Lines indicate cell density measured by fluorescence. Data show that the SRWTP discharge (located between station GRC and R44) does not explain the overall patterns in algal biomass or cell size in the river. Figure is from Parker et al. 2010.[343]

Short-term rate measurements made in the same study also contradict elements of the ammonium inhibition hypothesis. Rate measurements in Figure 9 show that primary production rates (black triangles) do not consistently decline in the downstream direction in the Sacramento River, and when they do, the decline is not initiated or intensified after water flows past the SRWTP discharge. The field data also show that ammonium uptake rates (orange symbols) are *not* inversely related to primary production rates.[344] Again, these field data directly contradict the

[343] Parker et al. 2010.

[344] Parker et al. 2010; District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

hypothesis that ammonium uptake causes a decrease in primary production in the river. These field data demonstrate that predictions about phytoplankton growth responses and ammonium uptake based on multiple-day, small container experiments in Wilkerson et al. 2006 and Dugdale et al. 2007 should not be presumed valid outside the laboratory, and cannot be considered evidence of impacts to aquatic life beneficial uses from SRWTP discharges.

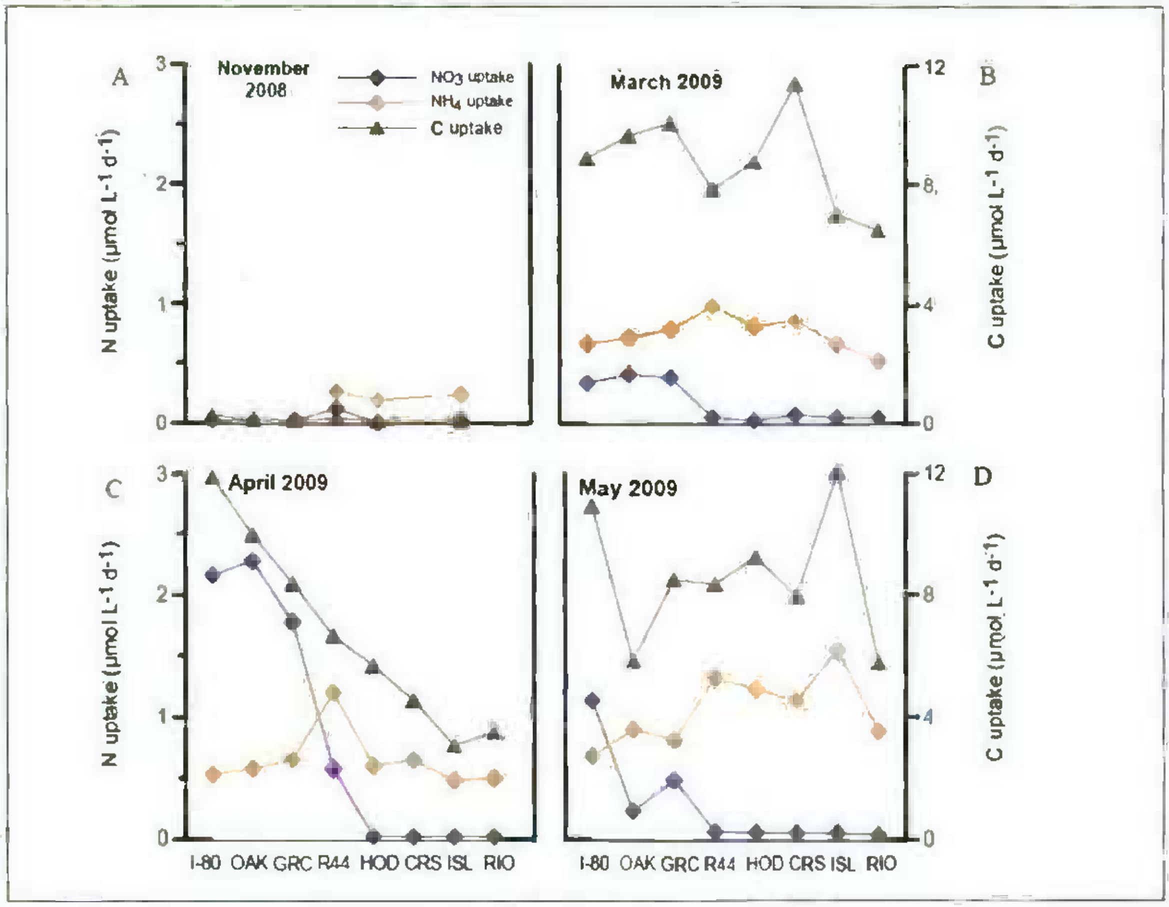

Figure 9. Primary production (C uptake; triangles) and phytoplankton uptake rates of ammonium (orange symbols) and nitrate (blue symbols) made during 24-hr incubations of Sacramento River water collected during four transects between I-80 bridge and Rio Vista. Data do not reveal an inverse relationship between primary production and ammonium uptake. Data further show that longitudinal patterns in primary production are not explained by the SRWTP discharge (located between GRC and R44). Figure is from Parker et al. 2010.[345]

Further, the Permit acknowledges that factors unrelated to the SRWTP discharge explain declines in chlorophyll-a (and other indices of phytoplankton biomass), which were observed between the Yolo/Sacramento County line and the Rio Vista locale during the 2008-2009 field

345 Parker et al. 2010.

studies.[346] Contrary to all of the evidence presented above, the Permit relies on unpublished work from an *oral presentation* at the September 2010 Bay-Delta Science Conference[347] to suggest otherwise. Specifically, the Permit quotes a conference abstract to find that ammonium uptake by phytoplankton controls primary production rates in the Sacramento River.[348]

The Permit's reliance on the conference abstract to make such a finding is misplaced. For example, the data displayed above in Figure 9 (which are contained in a report to the Regional Board) directly contradict the assertion that there is an inverse relationship between ammonium uptake and primary production. Further, representative data from the same longitudinal study referred to in the Permit[349] (see Figure 10 below), which were previously presented in a poster at a 2009 conference,[350] described in Engle 2010a,[351] (and presented in oral testimony by the water contractors at the December 9, 2010, Regional Board hearing),[352] also contradict the assertion of an inverse relationship between ammonium uptake and primary production.[353] The longitudinal transects by the Parker/Dugdale team during this 2008-2009 Sacramento River project included rate measurements (uptake of carbon, ammonia, and nitrate) at 21 stations starting from I-80 bridge above Sacramento downstream through Suisun Bay and into San Pablo Bay. These rate measurements show that primary production rates (carbon uptake, indicated by black line in

[346] See Permit, pp. J-6 to J-7 ("The decrease in chlorophyll[a] appears to commence above the SRWTP. The average annual decline in pigment between Tower Bridge in the City of Sacramento and Isleton is about 60 percent. The cause of the decline is not known, but has been variously attributed to algal settling, toxicity from an unknown chemical in the SRWTP effluent, or from ammonia. The SRWTP discharge cannot be [the] cause of pigment decline upstream of the discharge point, and may not be contributing to the decline downstream of the discharge point."); see also District's October 2010 Comments and Evidence Letter, p. 28.

[347] Parker, A., D. Dugdale, F. Wilkerson, and A. Marchi. 2010. Biogeochemical processing of anthropogenic ammonium in the Sacramento River and the Northern San Francisco Estuary. 6th Biennial Bay-Delta Science Conference, September 27-29, 2010. Sacramento, CA.

[348] Permit, p. J-6 ("Evidence for ammonia impairment of algal primary production in the Delta was reported for the first time at the 6th Biennial Bay-Delta Science Conference by Dr. Parker. Dr. Parker stated that a U-shaped pattern of primary production and chlorophyll was observed . . . with a maximum in the river above the SRWTP and again to the west in San Pablo Bay, essentially a mirror image of the distribution of ammonia concentrations." [internal footnote and italics omitted]).

[349] See fn. 178, *supra*.

[350] Parker et al. 2009.

[351] Engle 2010a.

[352] Hearing Transcript, p. 293:11-13.

[353] District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

Figure 10) can decline in the Sacramento River between the I-80 bridge and the confluence zone—*regardless of whether phytoplankton were principally taking up ammonia (shown by the red bars) or nitrate (shown by the blue bars)* at sampling locations. In other words, primary production rates can decrease *starting upstream* of the SRWTP, *despite the fact that nitrate dominated N uptake in that reach of the river*. Also, significant *increases* in carbon fixation began in the confluence zone (stations 649 through US3), despite the fact that inorganic nitrogen uptake was dominated by ammonium in that reach.[354] Collectively, these results imply that other factors (probably hydrodynamic factors such as stratification, current speed, residence time) are controlling phytoplankton biomass and primary production in the Sacramento River—not ammonium inhibition.

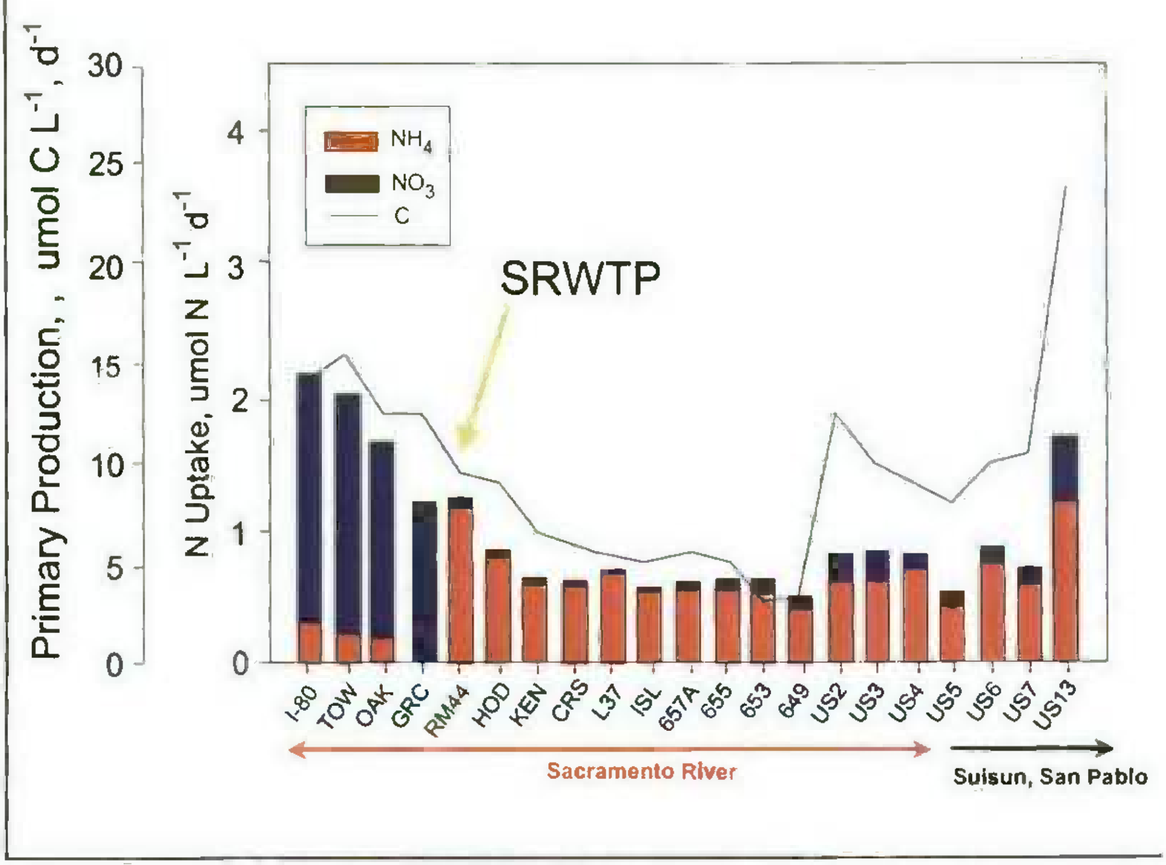

Figure 10. Longitudinal patterns in primary production (black line) and rates of ammonium uptake (red bars) and nitrate uptake (blue bars) in the Sacramento River. Data indicate that the location of the SRWTP (and a switch from nitrate to ammonium uptake) does not initiate the decline in primary production in the river, nor does ammonium uptake prevent increases in primary production in the confluence zone (stations 649 through US3). Figure is from Engle 2010a.

[354] See Figure 10.

(c) Evidence From Studies Conducted in the Delta Contradicts the Hypothesis That Ammonia (or Nutrient Ratios Involving Ammonia) Promote Blooms of *Microcystis* (Blue-Green Algae)

Attachment J to the Permit implies that *Microcystis* blooms "may" be associated with ammonia from the SRWTP.[355] *Microcystis* are considered to be less nutritious to primary consumers like zooplankton as compared to diatoms.[356] However, available research from the Delta—which is ignored in the Permit—argues against a simplistic association between *Microcystis* and nutrient form or concentration.[357] Delta studies conducted by Lehman et al. 2008 and 2010[358] and Mioni 2010[359] have found no apparent association between ammonium concentrations or NH_4^+:P ratios and either *Microcystis* abundance or toxicity. Instead, it appears from these studies that water temperature is strongly positively correlated with *Microcystis* abundance and toxicity, and that water transparency, flows, and specific conductivity are also potential drivers of *Microcystis* blooms in the Delta.[360] An association between water temperature and *Microcystis* blooms in the Delta is supported by the upward trend in spring-summer mean water temperature in the freshwater Delta between 1996 and 2005[361] and would be consistent with observations from other estuaries, where increased residence time (e.g., during drought) and

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[355] Permit, p. J-1.

[356] Permit, p. J-8.

[357] District's October 2010 Comments and Evidence Letter, pp. 29-30; Engle Written Testimony, p. 4.

[358] Lehman, P.W., G. Boyer, M. Satchwell, and S. Waller. 2008. The influence of environmental conditions on the seasonal variation of *Microcystis* cell density and microcystins concentration in the San Francisco Estuary. Hydrobiologia 600:187-204 (Lehman et al. 2008).

Lehman, P.W., S.J. Teh, G.L Boyer, M.L. Nobriga, E. Bass, and C. Hogle. 2010. Initial impacts of *Microcystis aeruginosa* blooms on the aquatic food web in the San Francisco Estuary. Hydrobiologia 637:229-248 (Lehman et al. 2010).

[359] Mioni, C.E., and A. Paytan. 2010. *What controls Microcystis bloom & toxicity in the San Francisco Estuary? (Summer/Fall 2008 & 2009).* Delta Science Program Brownbag Series, Sacramento, CA. May 12, 2010 (Mioni 2010).

[360] District's October 2010 Comments and Evidence Letter, p. 29; Engle Written Testimony, p. 4.

[361] Jassby, A. 2008. Phytoplankton in the Upper San Francisco Estuary: recent biomass trends, their causes and their trophic significance. San Francisco Estuary & Watershed Science, Feb. 2008 (Jassby 2008).

warmer temperatures are acknowledged as factors stimulating cyanobacterial (i.e., *Microcystis*) blooms.[362]

(d) The Permit Does Not Link Trends in Nutrient Ratios to Changes in Delta Phytoplankton Composition

The Permit recites hypotheses that exist with respect to nutrient ratios and phytoplankton composition.[363] Significantly, it does not make findings that such hypotheses are valid, as discussed below. However, because the hypotheses are mentioned in the Ammonia Issues Appendix, the District addresses this issue below. The Permit apparently refers to two sources: (1) an opinion presumably held by R. Dugdale,[364] and (2) a statistical analysis by P. Glibert 2010[365].[366] Dugdale's opinion, which is not articulated in any of his publications, is not directly supported by any publicly available experimental work conducted to date by his research group at San Francisco State University (SFSU).[367] Taxonomic changes in Delta phytoplankton (i.e., cell counts or other direct evidence of species composition) have not been reported for experimental manipulations of the NH4:NO3 ratio (i.e., grow-out experiments) by the Dugdale laboratory, nor has the work of Dugdale and his colleagues included experimental manipulations of N:P ratios. Similarly, although the Permit refers to a hypothesis advanced in Glibert 2010 (that nutrient ratios

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[362] Pearl, H.W., K.L. Rossignol, S. Nathan Hall, B.L. Peierls, and M.S. Wetz. 2009. Phytoplankton community indicators of short- and long-term ecological change in the anthropogenically and climatically impacted Neuse River Estuary, North Carolina, USA. Estuaries and Coasts. DOI 10.1007/s12237-009-9137-0 (Pearl et al. 2009).

Pearl, H.W., and J. Huisman. 2008. Blooms like it hot. Science 320:57-58. doi:10.1126/science.1155398 (Pearl & Huisman 2008).

Fernald, S.H., N.F. Caraco, and J.J. Cole. 2007. Changes in cyanobacterial dominance following the invasion of the zebra mussel *Dreissena polymorpha*: long-term results from the Hudson River Estuary. Estuaries and Coasts 30:163-170 (Fernald et al. 2007).

[363] Permit, pp. J-7 to J-8.

[364] The opinion in the Permit is attributed to "Dugdale et al." in the text (Permit, p. J-8), but not clearly associated to a source in the footnote. (Permit, p. J-7.)

[365] Glibert, P.M. 2010. Long-Term Changes in Nutrient Loading and Stoichiometry and Their Relationships with Changes in the Food Web and Dominant Pelagic Fish Species in the San Francisco Estuary, CA. Rev. Fish. Sci. 18:2, 211-232 (Glibert 2010).

[366] Permit, pp. J-7 to J-8.

[367] Taxonomic changes in Delta phytoplankton (i.e., cell counts or other direct evidence of species composition) have not been measured in experimental manipulations of the NH4:NO3 (i.e., grow-out experiments). The growth rates of different phytoplankton taxa have not been compared when presented with different N:P ratios in Delta water.

are responsible for the observed shift in the Delta phytoplankton community),[368] Glibert's conclusions were not based on direct experimental evidence of differential phytoplankton growth responses to nutrient ratios in the SFE.[369] Instead, Glibert arrived at her conclusions using an improperly applied statistical transformation (cumulative sums of variability, or CUSUM) to produce artificial and highly misleading correlations between nutrient parameters and biological parameters (phytoplankton, zooplankton, fish abundance).[370]

Glibert's approach is analytically and conceptually flawed, as detailed in Engle & Suverkropp (2010).[371] Further, the type of correlation analysis used in Glibert's article violates the underlying assumptions for linear regression and produces misleading results that are not supported by underlying data.[372] Other concerns include the limited geographic extent of the data; possible improper sub-sampling of CUSUM time series; nontransparent data reduction; and omissions of key analyses necessary to support a claim for a link between nutrient ratios and the food web or to support alternative hypotheses.[373] Examples of these defects are summarized below:

- Inadequate Geographic Coverage. Sweeping generalizations are made in Glibert's paper regarding the estuarine food web and the POD using data from only one station in the Freshwater Delta (Hood, IEP station C3) and two stations in Suisun Bay (IEP stations D8 and D7).

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[368] Permit, pp. J-7 to J-8.

[369] District's October 2010 Comments and Evidence Letter, p. 32.

[370] District's October 2010 Comments and Evidence Letter, pp. 32-33; Engle Written Testimony, p. 4; Sacramento Regional Wastewater Treatment Plant, NPDES Permit Renewal [Written] Testimony/Comments of Claus Suverkropp of Larry Walker Associates Regarding Statistical Analysis of the Potential Roles of Ammonia and Nutrient Ratios in the Upper San Francisco Estuary (Suverkropp Written Testimony), pp. 1-2.

[371] Engle, D. and C. Suverkropp. 2010. Memorandum: Comments for Consideration by the State Water Resources Control Board Regarding the Scientific Article *Long-term Changes in Nutrient Loading and Stoichiometry and their Relationships with Changes in the Food Web and Dominant Pelagic Fish Species in the San Francisco Estuary, California* by Patricia Glibert. 17 pp. July 29, 2010 (Engle & Suverkropp 2010).

[372] Engle & Suverkropp 2010, pp. 3-10.

[373] District's October 2010 Comments and Evidence Letter, pp. 32-33; Engle Written Testimony, p. 4; Suverkropp Written Testimony, pp. 1-2.

- Violation of Statistical Assumptions. Glibert used a calculation termed *CUSUM* to transform long-term datasets for nutrient concentrations and abundances of selected aquatic organisms, and then performed linear regression using the unordered transformed data for selected pairs of variables. Time series of CUSUM values exhibit features and patterns that diverge in several important ways from those of the underlying measured data and make them inappropriate for standard linear regression. CUSUM series mute seasonal or other short-term variation in a time series (which is meaningful for short-lived organisms like phytoplankton and zooplankton), but exaggerate shifts that occur on long time scales (such as decades). In the statistical literature, CUSUM is primarily used to create charts (or ordered values) for single variables that allow the user to detect change points or determine whether deviations from control points are random or signal a trend. However, the characteristics of CUSUM that lend it to change-point analysis and quality control make it completely inappropriate to perform standard linear regression using paired CUSUM values removed from their respective temporal sequences.

Accordingly, the simple CUSUM correlations that represent the basis for Glibert's conclusions violate virtually every assumption of a standard correlation analysis. CUSUM series are inherently serially correlated, heteroscedastic, and non-normally distributed, and the residuals of CUSUM correlations are non-independent.[374] Further, not all of the datasets used by Glibert are appropriate for customary uses of CUSUM. Autoregressive time series such as flow data are not appropriate for CUSUM change-point analysis. CUSUM change point analysis also assumes that underlying data are homoscedastic and often assumes that data are normally distributed. Glibert did not test raw data for autocorrelation, normality, or equal variance prior to the CUSUM transformation. Another requirement of CUSUM analysis is that time series being compared must start and stop at the same point in

[374] See Engle & Suverkropp 2010 for more detail.

time. However, Glibert's correlations appear to be performed by pairing CUSUM series for which underlying data spanned different ranges of years.

- <u>Artificial Relationships and Inflated R^2 Values</u>. The CUSUM transformation results in a very limited range of serially correlated data structures, which (if linear regression is performed for pairs of CUSUM series) leads to "correlations" with impressively inflated R^2 values that are largely artificial and cannot be interpreted in the same way as standard parametric correlation or regression analysis. Equally important, statistically significant relationships that *are* present in underlying data can be disguised when CUSUM time series are compared instead of real world measurements.
- <u>Biased selection of variables, including failure to relate trends in nutrient ratios to those of phytoplankton or copepods</u>. Several obvious pairings of environmental variables were omitted from Glibert's portfolio of CUSUM correlations, including those that were needed for her to claim that nutrient ratios and phytoplankton taxa were statistically related. For example, CUSUM regressions between nutrient *ratios* (TN:TP, NO_3:NH_4, or DIN:DIP) and phytoplankton indices (chl.a or abundances of individual taxonomic groups) were omitted from her analysis. Also, CUSUM trends in nutrient ratios were not directly compared to those for copepod abundance. NO_3:NH_4 trends were not compared to *any* of the biological trends (phytoplankton, copepods, clams, or fish. They were compared only to trends in Delta outflow. As a consequence, even if one were to accept Glibert's flawed correlation approach, her publication still does not provide evidence that nutrient ratios and phytoplankton composition are statistically related.[375]

Conversely, many well-known alternative hypotheses for the observed changes in plankton composition and fish abundance in the SFE (and in estuaries, generally)—which would have been testable using her CUSUM methodology—were omitted from her analysis and discussion in her article.[376] Due to the peculiarity of the CUSUM transformation, it is likely that a

[375] Engle & Suverkropp 2010; Engle Written Testimony, p. 4; Suverkropp Written Testimony, pp. 1-2.

[376] District's October 2010 Comments and Evidence Letter, p. 33; Engle Written Testimony, p. 4.

wide variety of non-nutrient environmental factors (essentially any factors which have trended over time in the SFE in concert with changes in fish abundance such as clam abundance, turbidity, or water exports) could be shown as highly correlated with pelagic fish abundance using CUSUM correlations.[377] For example, Figure 11 shows that when subjected to the same analysis used in Glibert's paper, annual water exports perform as well as ammonia concentrations in explaining trends in the summertime abundance of delta smelt. Glibert's CUSUM correlations between fish abundance and ammonia are convenient for focusing attention on ammonia (as opposed to other potential drivers of the food web or POD).[378] However, the correlations ultimately signify little with respect to the relative importance of multiple environmental factors which have changed over recent decades in the SFE.

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[377] District's October 2010 Comments and Evidence Letter, p. 33; Engle Written Testimony, p. 4; Suverkropp Written Testimony, pp. 1-2.

[378] District's October 2010 Comments and Evidence Letter, p. 33; Engle Written Testimony, p. 4; Suverkropp Written Testimony, pp. 1-2.

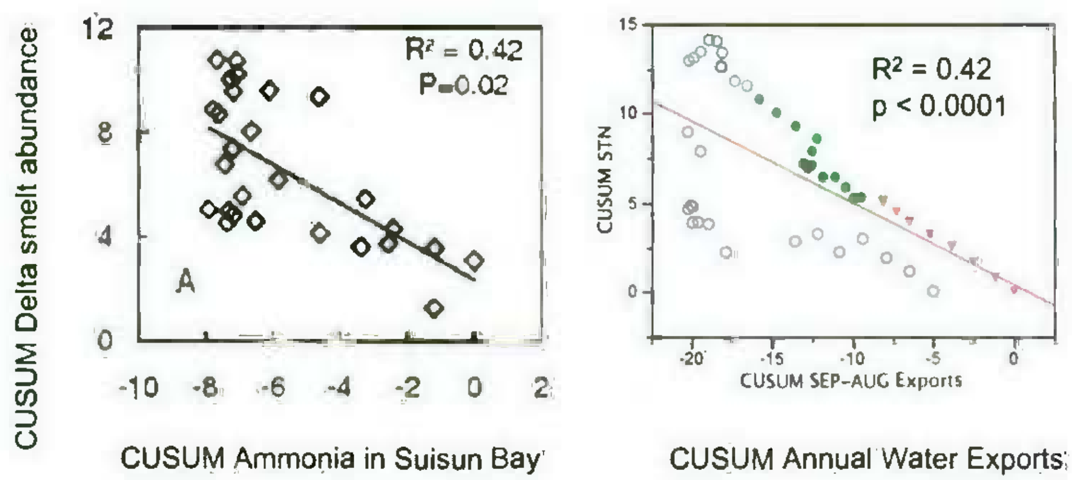

Figure 11. Comparison of correlations using CUSUM ammonia (Suisun Bay) or CUSUM annual Delta water exports (SWP, CVP, and Contra Costa Canal combined) as the independent variables (x-axis) and CUSUM values for the delta smelt Summer Townet Index as the dependent variable (y-axis). Correlation using ammonia is from Glibert 2010 and used data for 1975-2005. Correlation using annual water exports is from Engle & Suverkropp 2010. Color coding for subsets of the CUSUM series is as follows: open blue circles for pre-*Corbula* years (1956-1986), solid green circles for post-*Corbula* years 1987-1999, and red triangles for POD years 2000-2007. Details regarding underlying analyses are in Engle & Suverkropp 2010. The correlation coefficient (R^2 value) is the same for both regressions (0.42); both regression lines are significant. Figure is a combination of Figures 3 and 4 from Engle & Kuverkropp 2010.

Ultimately, the Permit recognizes the limitations associated with these theories that attempt to link nutrient ratios to changes in the Delta phytoplankton composition.[379] The Permit also acknowledges that additional studies are necessary to determine if nutrient control would have hypothesized effects on phytoplankton community structure.[380] Yet, despite these caveats, the Permit fundamentally relies on inappropriate and unsupported hypotheses to theorize (and

[379] Permit, p. J-8 ("Whether this [shift in algal communities] is the result of changes in nutrient concentrations and/or ratio is not known.").

[380] Permit, p. J-8 ("Follow up studies are needed to determine the ecological effect of the change in nutrient concentrations and ratios on the phytoplankton community and whether nutrient control might cause the community to revert back to a diatom-based system.").

allege) that discharges from the SRWTP are a cause of the POD and therefore full nitrification is justified. Clearly, the evidence in the record and the uncertainty identified in the Permit itself suggest otherwise.

(e) The Permit Ignores Alternative Hypotheses That Would Explain Observed Changes in Phytoplankton Composition in the Delta, Including the Occurrence of *Microcystis* Blooms

Although readily available and part of the Permit record, in adopting the Permit, the Regional Board ignored other information that suggests *physical factors* (e.g., temperature, current speed, residence time, turbulent mixing, stratification, light penetration) may be strongly affecting competitive outcomes between diatoms and other phytoplankton taxa in the Delta.[381] In particular, the influence of flows and residence time on phytoplankton assemblages in estuaries is well-acknowledged in other regions.[382] For example, hydrologic perturbations (e.g., droughts, floods, and storm-related deep mixing events) overwhelm nutrient controls on phytoplankton composition in the Chesapeake Bay; diatoms are favored during years of high discharge and short residence time.[383] The expert panel convened by CalFed in March 2009 summarized the impact of flow and residence time on estuarine microfloral composition in their final "*Ammonia Framework*" document, stating:

> [d]iatoms have fast growth rates and may be particularly good competitors during high flows with concomitant short residence times, when their fast growth rates can offset high flushing rates. In moderate flows, chlorophytes and cryptophytes become more competitive, whereas low flows with concomitant longer residence times allow the slower-growing cyanobacteria, non-nuisance picoplankton, and dinoflagellates to contribute larger percentages of the community biomass. These spatially and temporally-variable patterns of phytoplankton composition are typical of many estuaries [e.g., Chesapeake Bay, Maryland; Neuse-Pamlico Sound, North Carolina; Narragansett Bay, Rhode Island; Delaware Bay, Delaware]. (Meyer et al. 2009, p. 5.)[384]

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[381] District's October 2010 Comments and Evidence Letter, pp. 30-31; Engle Written Testimony, p. 4.

[382] District's October 2010 Comments and Evidence Letter, p. 30; Engle Written Testimony, p. 4.

[383] Pearl, H.W., L.M. Valdes, B.L. Peierls, J.E. Adolf, and L.W. Harding, Jr. 2006. Anthropogenic and climatic influences on the eutrophication of large estuarine ecosystems. Limnol. Oceanogr. 51:448-462 (Pearl et al. 2006).

[384] Meyer, J.S., P.J. Mulholland, H.W. Paerl, and A.K. Ward. 2009. A framework for research addressing the role of ammonia/ammonium in the Sacramento-San Joaquin Delta and the San Francisco Bay Estuary Ecosystem. Final report submitted to CalFed Science Program, Sacramento, CA, April 13, 2009 (Meyer et al. 2009).

The idea that flows influence diatom abundance is not new in the Delta. Lehman 1996 and 2000[385] associated a multi-decadal decrease in the proportional biomass of diatoms in the Delta and Suisun Bay to climatic influences on river flow. Regional Board staff recently found that current speed in the Sacramento River was related to the difference in phytoplankton biomass between Freeport and Isleton.[386]

Additionally, top-down effects on phytoplankton composition—caused by selective grazing by clams and zooplankton—are not acknowledged in the Permit, but are likely to influence the species composition of phytoplankton in the SFE, and may contribute to the occurrence of *Microcystis*.[387] Clam grazing selectively removes larger particles from the water column;[388] clams may consume a larger fraction of diatoms than smaller plankton taxa such as flagellates. Kimmerer 2005[389] attributed a step decrease in annual silica uptake after 1986 to efficient removal of diatoms by *C. amurensis* after its introduction in 1986. Grazing by *Corbicula fluminea* can cause shallow habitats in the freshwater Delta to serve as a net sink for phytoplankton.[390] Thus, it is possible that diatoms are differentially affected by benthic grazing (as compared to motile or buoyant taxa) in both the brackish and freshwater Delta. Significantly,

385 Lehman, P.W. 1996. Changes in chlorophyll-a concentration and phytoplankton community composition with water-year type in the upper San Francisco Estuary. (pp. 351-374) In Hollibaugh, J.T, (ed.) San Francisco Bay: the ecosystem. San Francisco (California): Pacific Division, American Association for the Advancement of Science (Lehman 1996).

Lehman, P.W. 2000. The influence of climate on phytoplankton community biomass in San Francisco Bay Estuary. Limnol. Oceanogr. 45:580-590 (Lehman 2000).

386 Foe et al. 2010, p. 13.

387 District's October 2010 Comments and Evidence Letter, pp. 31-32; Engle Written Testimony, p. 4.

388 Werner, I., and J.T. Hollibaugh. 1993. *Potamocorbula amurensis*: Comparison of clearance rates and assimilation efficiencies for phytoplankton and bacterioplankton. Limnol. Oceanogr. 38:949-964 (Werner & Hollibaugh 1993).

389 Kimmerer 2005.

390 Lopez, C.B., J.E. Cloern, T.S. Shraga, A.J. Little, L.V. Lucas, J.K. Thompson, and J.R. Burau. 2006. Ecological values of shallow-water habitats: implications for the restoration of disturbed ecosystems. Ecosystems 9:422-440 (Lopez et al. 2006).

Parchaso F., and J. Thompson. 2008. *Corbicula fluminea* distribution and biomass response to hydrology and food: A model for CASCaDE scenarios of change. CalFed Science Conference, Sacramento, CA. October 2008 (Parchaso & Thompson 2008). Avail at http://cascade.wr.usgs.gov/CalFed2008.shtm.

benthic grazing has been implicated as a factor favoring *Microcystis* over other phytoplankton.[391] Grazing by zooplankton can also exert a top-down effect on phytoplankton composition.[392]

ii. The Permit Fails to Include Evidence That a Shift in Phytoplankton Composition in the Estuary Represents a Degradation of Food Resources at the Bottom of the Food Web

The Permit references a shift in phytoplankton composition that has been observed in the upper SFE (the brackish and freshwater Delta), characterized by a decline in the relative abundance of diatoms and an increase in other taxa (e.g., flagellates, green algae, and cyanobacteria) as one possible hypothesis as to how discharges of ammonia from the SRWTP may be affecting the aquatic life beneficial uses.[393] With this hypothesis, it is automatically assumed in the Permit that these changes in phytoplankton composition signal a deterioration in the quality of food for estuarine mesozooplankton and calanoid copepods in particular, which may then have repercussions for pelagic fish that eat them.

For example, the Permit recites a claim that large diatoms are better food for SFE zooplankton than other classes of phytoplankton.[394] However, there is no direct evidence cited in the Permit or the record that supports this supposition.[395] Further, it is directly contradicted by experimental evidence from Delta research.[396] With the exception of the recent occurrence of the toxic alga *Microcystis*, there is little basis for the assumption that the observed shift in phytoplankton composition is a negative development for the key copepods, which are prey for POD fishes, or for other zooplankton in the estuary.

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[391] See Meyer et al. 2009. p. 4 ["However, in places where filter-feeding mussels and clams overlap with habitat suitable for *Microcystis* (i.e., low salinity), the presence of these invertebrates might enhance bloom formation by selectively rejecting large *Microcystis* colonies. That grazer selectivity can give *Microcystis* a grazer-resistant, competitive advantage over other phytoplankton, as Vanderploeg et al. (2001) reported for zebra mussels (*Dreissena polymorpha*) in the Great Lakes."].

[392] See, e.g., Ger, K.A., P. Arneson, C.R. Goldman, and S.J. Teh. 2010. Species specific differences in the ingestion of *Microcystis* cells by the calanoid copepods *Eurytemora affinis* and *Pseudodiaptomus forbesi*. Short Communication. J. Plankton Research. doi: 10.1093/plankt/fbq071 (Ger et al. 2010). (Selective grazing by the Delta copepod *P. forbesi* was demonstrated as a viable mechanism for promoting *Microcystis* blooms.)

[393] Permit, pp. J-7 to J-8.

[394] Permit, p. J-8.

[395] District's October 2010 Comments and Evidence Letter, pp. 33-34; Engle Written Testimony, p. 4.

[396] District's October 2010 Comments and Evidence Letter, pp. 33-34; Engle Written Testimony, p. 4.

The Regional Board had ample evidence challenging the simplistic diatom → copepod → fish "paradigm" that is used to justify much of the attention regarding ammonia and the SFE food web.[397]

1. Published experiments from the Delta show that key Delta copepods—including the ones that delta smelt eat—actually prefer *non*-diatom types of phytoplankton, and much of the time delta smelt do not consume phytoplankton at all (preferring instead to consume small heterotrophic organisms in the water column).[398] These feeding experiments indicate that the principal calanoid copepods in the estuary (*Acartia* spp., *E. affinis*, *P. forbesi*) prefer motile prey over non-motile prey and heterotrophic prey (e.g., cilliates, heterotrophic dinoflagellates) over phytoplankton.[399] Diatoms are not motile as they lack flagella or other means of locomotion. Thus, Delta copepods do not rely on diatoms—or even on phytoplankton—as a direct food source and frequently discriminate against phytoplankton altogether (even during diatom blooms) depending on season and location in the estuary. In reality, some of the types of phytoplankton preferred by the copepods (e.g., flagellates) are now *more abundant* in the estuary than in previous decades.

2. In adopting the Permit, the Regional Board ignored a large body of literature that indicates direct feeding on diatoms can cause reproductive failure in copepods.[400] This potential harmful effect of diatoms on copepods, first described in the early 1990s, prompted an ongoing re-evaluation of the paradigm that "diatoms-beget-copepods-beget-fish" that has been the subject of considerable research and special workshops and symposia. The harmful effect is caused by

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[397] See, e.g., Hearing Transcript, pp. 187:7-193:5; SRCSD Hearing Exhibits, PowerPoint slides 17-19, 22-23; Districts' October 2010 Comments and Evidence Letter, pp. 34-35.

[398] Heterotrophic organisms obtain energy by consuming pre-existing organic matter, as opposed to synthesizing organic matter through photosynthesis.

[399] Bollens, Gretchn C. Rollwagen, Penry, Deborah L. 2003. Feeding dynamics of *Acartia* spp. copepods in a large, temperate estuary (San Francisco Bay, CA) (Bollens & Penry 2003).

Bouley, P. and W.J. Kimmerer. 2006. Ecology of a highly abundant, introduced cyclopoid copepod in a temperate estuary. *Marine Ecology-Progress Series*, 324, 219-228 (Bouley & Kimmerer 2006).

Gifford, S.M., G. Rollwagen-Bollens, and S.M. Bollens. 2007. Mesozooplankton omnivory in the upper San Francisco estuary. *Marine Ecology-Progress Series*, 348, 33-46 (Gifford et al. 2007).

[400] See Ianora, A. and A. Miralto. 2010. Toxigenic effects of diatoms on grazers, phytoplankton and other microbes: a review. *Ecotoxicology*, 19, 493-511 (Ianora & Miralto 2010).

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organic compounds (oxylipins), which are released from diatom cells when they are broken during feeding. These compounds then induce genetic defects in copepod eggs. The genetic defects are manifested by a failure of the eggs to hatch or a failure of hatched offspring to develop normally. These effects are unrecognized in lab or field studies that rely on egg counts to determine the nutritional status of copepods because the harmful compounds involved do not affect the numbers of eggs produced, but the viability of the eggs that are produced. There are at least 24 recent experiments indicating harmful effects of diatom grazing for copepod species pertinent to the SFE (i.e., SFE species and their cofamilials).[401]

3. The reproductive implications of food *choices* are virtually unstudied for the copepods of the SFE. For example, a recent review of almost 400 research articles revealed that only three published studies measured egg production or hatching success for SFE-pertinent copepod species fed mixtures of diatoms and non-diatoms.[402] In other words, there is essentially no direct evidence that observed changes in phytoplankton composition in the estuary would have had population-level consequences for copepods.

4. Non-diatom classes of phytoplankton (including some groups which are now more abundant in the estuary) include species that are considered highly nutritious for zooplankton. Examples include cryptophytes (e.g., *Cryptomonas* and *Rhodomonas* spp.) and *Scenedesmus* spp. (e.g., some species of green algae), which are used as food to rear zooplankton in laboratories.

5. Chlorophyll-a levels below 10 μg/L are frequently cited as evidence that zooplankton in the Delta are food limited.[403] However, this threshold is based on growth experiments conducted with a single cladoceran zooplankton species (*Daphnia magna*). It is unclear whether the threshold is appropriately applied to any of the copepods in this system.

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[401] See Figure 12; see also District's October 2010 Comments and Evidence Letter, p. 35; Engle Written Testimony, p. 4.

[402] See Engle, D. 2010c. Slides and Oral Remarks Presented in: *Engle, D. (2010) How well do we understand the feeding ecology of estuarine mesozooplankton? A survey of the direct evidence*. 6th Biennial Bay-Delta Science Conference, Sacramento, CA, September 27-29, 2010, 31 pp. (Engle 2010c).

[403] Müller-Solger, A.B., A.D. Jassby, and D.C. Müller-Navarra. 2002. Nutritional quality of food resources for zooplankton (*Daphnia*) in a tidal freshwater system (Sacramento-San Joaquin River Delta). Limnol. Oceanogr. 47:1468-1476 (Müller-Solger et al. 2002).

6. The heavy reliance of SFE copepods on non-algal foods indicates that detritus-based pathways for energy transfer may contribute more to the pelagic food web in the Delta than has been acknowledged. Such information led the IEP to make the following acknowledgement in its 2007 Synthesis of Results:

> . . . it is possible that the hypothesis that the San Francisco Estuary is driven by phytoplankton production rather than through detrital pathways may have been accepted too strictly.[404]

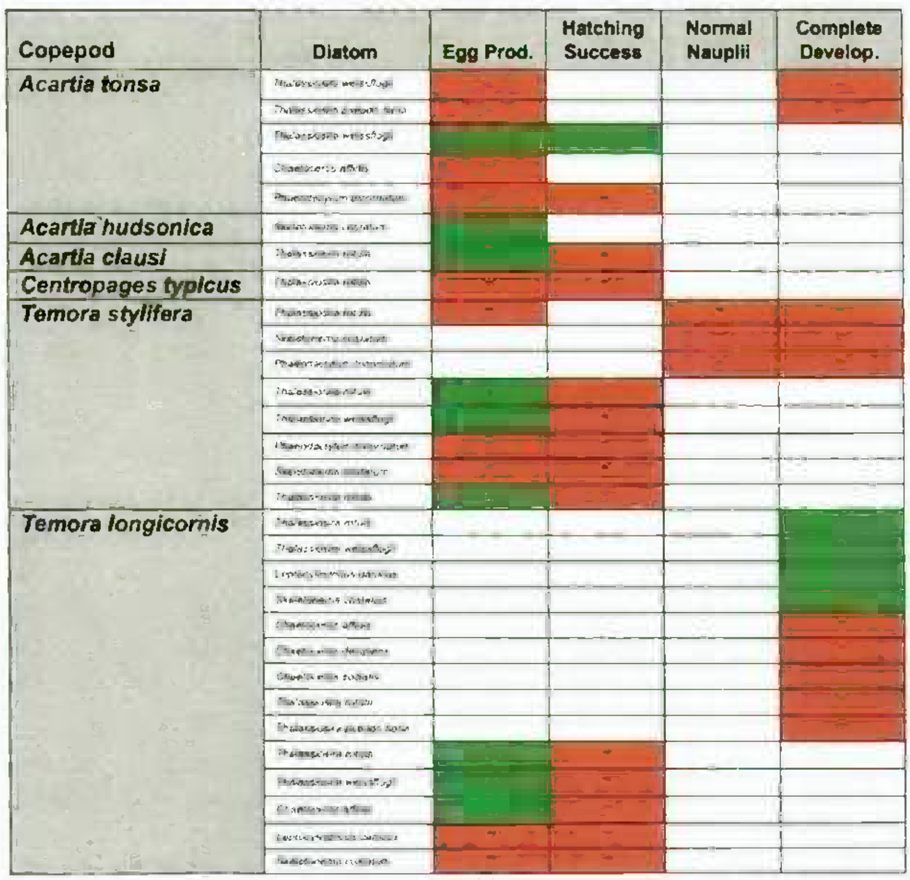

Figure 12. Reproductive consequences of direct feeding on diatoms for Delta copepod taxa. Experiments listed used copepod species from the Delta or their cofamilials. Positive (green) and negative (red) outcomes are indicated for four measures of reproductive success in feeding experiments: egg production (clutch size), hatching success, normal nauplii, and complete development of nauplii. Data are from the review of Ianora & Miralto 2010[405] and other published literature reviewed in Engle 2010c.[406] Figure is from Engle 2010c.

[404] Baxter, R., R. Breuer, L. Brown, M. Chotkowski, F. Feyrer. M. Gingras. B. Herbold, A. Müller-Solger, M. Nobriga, T. Sommer, and K. Souza. 2008. Pelagic organism decline progress report: 2007 Synthesis of results. Interagency Ecological Program for the San Francisco Estuary (Baxter et al. 2008), p. 25.

[405] Ianora & Miralto 2010.

[406] Engle 2010c.

iii. Hypothesis Regarding Inhibition to Diatoms Is Not an Appropriate Water Quality Criteria

The Permit includes a finding that "[r]ecent studies provide evidence that ammonia from the SRWTP discharge is contributing to the inhibition nitrogen uptake by diatoms in Suisun Bay."[407] However, the Permit fails to properly support this finding or explain how such a finding leads to the adoption of the final effluent limitations for ammonia. As indicated in sections VI.A.2 and VI.B.1.b.iii above, when interpreting narrative criteria to derive effluent limitations, the Regional Board must conduct a case-by-case evaluation to determine if numerical criteria developed and/or published by other agencies are relevant and applicable.[408]

In this case, the Regional Board relies on experiments conducted by Dr. Richard Dugdale that found ammonia suppression of nitrate assimilation and primary production rates at 0.014 mg-N/L with complete shutdown by 0.056 mg-N/L.[409] Using these results, the Regional Board determined that ammonia concentrations in the Sacramento River from SRWTP discharges would need to be decreased to ensure that ambient levels of ammonia were below these levels. The alleged reduction in effluent concentrations needed are described as "comparable" to those resulting from limits derived from U.S. EPA's ammonia criteria without the consideration of dilution.[410]

While the limits may coincidentally be "comparable," there is no direct relationship between Dugdale's results from his small container experiments and limits derived from the U.S. EPA ammonia criteria. Furthermore, the Permit is void of any bona-fide analysis (e.g.,

[407] Permit, p. F-56.

[408] Basin Plan, p. IV-17.00.

[409] Permit, pp. J-5 to J-6.

[410] Permit, p. J-6 ("[t]hese values [adopted limits] are comparable to the decreases needed for the Delta and for Suisun Bay to eliminate the ammonia impairment of nitrogen uptake and primary production by the phytoplankton community.").

modeling or other approach) which would allow them to determine what reductions in ammonia would result in downstream concentrations.[411]

More importantly, the Regional Board did not comply with applicable regulations and the SIP in establishing the effluent limitations. Its reliance on Dugdale's experiments to interpret the narrative toxicity objective is inappropriate and violates the Basin Plan policy. Specifically, the Regional Board did not conduct a proper case-by-case analysis to determine if the Dugdale information was relevant and appropriate in interpreting applicable narrative criteria. The Permit includes many statements that undermine the relevance and applicability of the Dugdale ammonia inhibition data to SRWTP discharges.[412] With this uncertainty and the over-whelming amount of evidence contrary to the Regional Board's findings, it is improbable to believe that a case-by-case analysis and determination of relevancy actually occurred. Accordingly, the Regional Board has inappropriately relied on the ammonia inhibition hypothesis to find that acute and/or chronic mixing zones are improper due to beneficial use affects in the far field based on unpublished, speculative water quality criteria. Based on all of the information provided above, the Regional Board's findings with respect to far field aquatic life impacts are not supported by the evidence in the record. Further, the Regional Board has failed to comply with federal regulations and state policy that apply when deriving effluent limitations from a determination of reasonable potential to cause or contribute to a violation of a narrative water quality standard (i.e., the narrative toxicity water quality objective). Instead of conducting required case-by-case analyses for each hypothesized criteria and determining if it is relevant to the SRWTP discharge, the Permit incorporates Attachment J, which summarizes the different studies and theories associated with ammonia in the Delta. Attachment J does not include a case-by-case analysis as required by the federal regulations and the Basin Plan. It does not calculate any limits based on alleged

[411] Permit, p. J-6. The Regional Board's statement here was provided for the first time in the revised November Tentative Permit, after the close of the public comment period. (See November Redline Tentative Permit, p. J-6.) Thus, the District had no opportunity to provide written comments on the statements in question related to this hypothesis.

[412] See, e.g., Permit, p. J-5 ("The causes of low primary production are not understood."); Permit, p. J-7 ("The cause of decline is not known . . . . The SRWTP discharge cannot be cause of pigment decline upstream of the discharge point, and may not be contributing to the decline downstream of the discharge point."); see also Staff Report, p. 14 ("The overall impact of nitrate uptake inhibition, particularly on Delta Smelt food, is not completely understood.").

reasonable potential to exceed narrative objectives. Thus, the Permit findings associated with Attachment J and discussed above must be struck down.

2. Denial of Mixing Zones, and Requirements for Full Nitrification Are Inappropriate and Not Necessary to Ensure Compliance With Dissolved Oxygen Water Quality Objectives

In addition to denying dilution based on improper findings with respect to copepods, diatom inhibition, etc., and interpretations of narrative objectives in general, the Regional Board also included a finding related to dissolved oxygen levels in the Delta. Specifically, the Regional Board found: "The Discharger's effluent contains ammonia and BOD at levels that use all the assimilative capacity for oxygen demanding substances in the Sacramento-San Joaquin Delta. This results in no assimilative capacity for other cities and communities to discharge oxygen demanding constituents, which is needed for them to grow despite the fact that most of these cities and communities are already implementing Best Practicable Treatment or Control (BPTC) at their own facilities and SRWTP is not."[413] To reach this conclusion, the Regional Board assumed that "the River at times, is less than the water quality objective of 7.0 mg/L and the Discharger is currently using all the assimilative capacity in the Sacramento River from Freeport to Rio Vista for oxygen demanding constituents."[414] The Regional Board's assumption is based on data collected at Hood by DWR.

There is no dispute that the applicable water quality objective is 7.0 mg/L.[415] There is also no dispute that the objective is intended to protect aquatic species.[416] However, as with other

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[413] Permit, pp. F-56 to F-57. The District objects to the statements made with respect to SRWTP effluent using all assimilative capacity for oxygen demanding substances and that certain communities already are implementing BPTC and will be harmed. The arguments are misplaced and references to BPTC are irrelevant. The effects of the SRWTP discharge occur in the lower Sacramento River between Freeport and Rio Vista and do not extend to other areas in the Delta. Also, few, if any, of the POTWs listed in Attachment J discharge to the lower Sacramento River or its tributaries, and are sufficiently distant from this reach of the Sacramento River to be unimpacted by the allocation of dissolved oxygen assimilative capacity to the SRWTP. (See District's October 2010 Comments and Evidence Letter, pp. 42-43, 46.)

[414] Permit, p. J-10.

[415] Basin Plan, p. III-5.00 ("Within the legal boundaries of the Delta, the dissolved oxygen concentration shall not be reduced below: 7.0 mg/L in the Sacramento River (below the I Street Bridge) and in all Delta waters west of the Antioch Bridge; . . . .").

[416] Hearing Transcript, pp. 127:24-128:1 ("Probably the most sensitive organism [that the 7.0 mg/L objective is intended to protect] is salmon, especially larval salmon moving downstream.").

issues related to the Regional Board's denial of mixing zones for ammonia, the Permit finding has basic flaws, both technical and legal/regulatory in nature.

The technical issues concern the applicability of DWR's Hood data versus model results, recent data results, and the inability of anyone to explain the low bias of data from Hood. The Regional Board used the data discrepancy to reject the District's Low Dissolved Oxygen Prevention Assessment (LDOPA) report (LDOPA 2010)[417] conclusions and found that full nitrification is necessary to ensure compliance with the dissolved oxygen objective. However, as shown below, the data in question is suspect and not a proper basis for rejecting the LDOPA 2010 model results, or reliable to make findings with respect to assimilative capacity. Further, the Regional Board fails to make any meaningful distinctions between the LDOPA 2010's Wet season and Dry season conclusions and instead portrays the Wet season conclusions as the only relevant conclusions.

The legal/regulatory issue concerns the irrelevance of the dissolved oxygen question to the granting or denial of a mixing zone related to the narrative toxicity objective. The Regional Board's findings have no logical or rational connection to the calculation of effluent limitations for ensuring compliance with the dissolved oxygen objective. Certainly, the Regional Board can develop numeric limitations for oxygen demanding substances including ammonia as a WQBEL based on proper analysis and compliance with applicable laws and regulations. But the denial of mixing zones for ammonia here has nothing to do with that issue.

a. DWR Hood Data Is Unreliable and Should Not Be Relied Upon

As discussed at length and explained in the District's October 2010 Comments and Evidence Letter, the LDOPA 2010, which includes a model, shows that at current SRWTP performance and a discharge rate of 181 mgd, dissolved oxygen concentrations in the Sacramento River downstream of the SRWTP do not and would not drop below the 7.0 mg/L Basin Plan objective during the Wet season from November 1 through April 30.[418] Conversely, the

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[417] Sacramento Regional County Sanitation District, Low Dissolved Oxygen Prevention Assessment, prepared by Larry Walker Associates (May 2010) (LDOPA 2010).

[418] District's October 2010 Comments and Evidence Letter, p. 40; see also LDOPA 2010.

LDOPA 2010 did show that reduction in ultimate oxygen demanding (UOD) substances (i.e., BOD and/or ammonia) were needed in SRWTP effluent during the Dry season period of May 1 through October 31 to ensure that for future conditions, including potential critical drought periods, dissolved oxygen concentrations in the Sacramento River downstream of the SRWTP remain above the applicable Basin Plan objective of 7.0 mg/L.[419] Based on these findings, the LDOPA 2010 recommended that the Regional Board adopt seasonal UOD limits of 275,000 lbs/day AMEL and 438,000 lbs/day MDEL for the Wet season and 169,000 lbs/day AMEL and 234,000 lbs/day MDEL for the Dry season.[420] The District's recommendations for UOD limits are proper WQBELs as they are designed to ensure compliance with the adopted water quality objective for dissolved oxygen.[421] Specifically, by controlling the amount of UOD in the effluent, receiving water dissolved oxygen objectives can be met.[422]

The Regional Board staff rejected the District's recommendations, claiming that although the model was technically sound, there were concerns with the data used (or not used) to calibrate the model.[423] Specifically, the Regional Board staff stated that it may only discard data, "if certified information from a laboratory, or other quality assurance/quality control (QA/QC) is made available to illustrate that the data is not representative of the water sample."[424] The Regional Board then concludes, "[t]here is no sufficient evidence to discard the DWR data."[425] In all cases, the Regional Board's determinations are not supported by evidence in the record and fail to comply with applicable state and federal regulations.

The data set in question shows dissolved oxygen concentrations at Hood to be below 7.0 mg/L at times.[426] However, due to concerns with the data, the District and others found it

[419] District's October 2010 Comments and Evidence Letter, p. 40; see also (LDOPA 2010).

[420] LDOPA 2010, p. 2/25, as corrected in Table 5 Correction for May 2010 LDOPA (August 30, 2010), attached to email from Vyomini Pandya to Kathleen Harder (August 30, 2010).

[421] See 40 C.F.R. § 122.44(d)(1)(iii).

[422] LDOPA 2010.

[423] Staff Response to Comments, p. 53.

[424] Staff Response to Comments, p. 53.

[425] Staff Response to Comments, p. 53.

[426] See Staff Response to Comments, p. 53.

inappropriate to use this data to calibrate the LDOPA 2010 model.[427] First, it is important to note that the LDOPA 2010 model was found to be technically sound by the Regional Board's technical consultant (Tetra Tech) as well as Regional Board staff.[428] No evidence was presented by Regional Board staff, or anyone else, to discount or change this finding regarding the model itself.[429]

As was explained at the Regional Board hearing, the LDOPA 2010 model could not replicate the results portrayed in the DWR Hood data.[430] Further, side-by-side comparisons of DWR's Hood data to new 2010 data collected under a Regional Board reviewed and approved rigorous and well-designed Quality Assurance Plan[431] indicate that there is a low bias problem with DWR's continuous data at Hood.[432] The issue of low bias is documented not only in technical memorandum submitted by the District[433] but also by the Regional Board's technical experts.[434]

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[427] See, e.g., Memorandum to Bob Seyfried, SRCSD, from Mitch Mysliwiec, Larry Walker Associates, *SRCSD DO Continuous Monitoring Preliminary Results and Ambient DO Datasets Assessment* (July 14, 2010) (DO Data Memo), pp. 12-21.

[428] Staff Response to Comments, p. 53; see also Permit, p. F-33.

[429] See Hearing Transcript, p. 236:3-5 (the Executive Officer engaged in a discussion with the Regional Board regarding the elimination of Hood data and the model's inability to replicate the information. However, during this exchange no evidence or finding was made to suggest that the District's model was not sound).

[430] Hearing Transcript, p. 234:4-10 ("When we looked at the Rio Vista data, our model could pretty well replicate what's going on. But when we tried to match our data to Hood station, it was nearly impossible to match our model to the Hood data. If we tried to . . . input numbers into the model, the oxygen sag would go so low at Hood it would continue to go down.").

[431] See Email from Kathleen Harder to Robert Seyfried (March 25, 2010); see also DO Data Memo, pp. 3-12.

[432] Regional Board staff suggests that the District's data showed an upward bias. (Staff Report, p. J-10.) However, Regional Board staff provides no evidence indicating that the District's data had any QA/QC concerns. To the contrary, the District's data was collected under a very rigorous QA/QC plan (see fn. 261), while email correspondence between Regional Board staff and DWR staff indicate that there have been problems with DWR's Hood data in the past. (See, e.g., DO Data Memo, Appendix B [Email from Mike Dempsey, DWR staff, to Kathleen Harder, Regional Board (Feb. 25, 2009) (provides information with respect to upward adjustments of dissolved oxygen data at Hood)].)

[433] DO Data Memo.

[434] Email from Jim Parker of PG Environmental to Kathleen Harder (July 19, 2010) ("1. The new 2010 DO data appear to be collected under a rigorous and well-designed QA plan. 2. Side-by-side comparisons for April-June confirm that there is a low bias problem with CDEC continuous data at Hood. The reason for this low bias is not known with certainty, but likely relates to fouling of the plastic membrane on the Clark Cell sensor . . . .").

Due to this low bias, which was further confirmed by the District's 2010 data referenced in J. Parker's email, the District determined it necessary to exclude the Hood data in the calibration of its model. This decision was supported by the Regional Board's technical consultant, Tetra Tech. "Unfortunately, the DO data obtained at Hood during most of 2008 may be incorrect . . . In any case, the data at Hood do not appear usable for calibration at this time."[435] On the other hand, the only information the Regional Board staff presents to suggest that the data are valid is that they asked DWR staff to review the Hood data collected from June 2008 through December 2009, and DWR staff reported that in many instances the dissolved concentrations at Hood were below 7.0 mg/L.[436] The Regional Board presents no other evidence to support the validity of the Hood data in question. Conversely, an email exchange between Regional Board staff and DWR staff suggest that the DWR Hood data has had low bias issues in the past and has been corrected upwards on numerous occasions.[437] Regional Board staff also provided testimony that they too share concerns with the DWR Hood data: "Dissolved oxygen, the district referred to a number of letters from Tetra Tech and others about problems with the Department of Water Resources Hood data. We absolutely agree with those letters. We are concerned about that data."[438]

The Regional Board has general authority and responsibility to disregard unreliable and un-representative data. Contrary to its representation, such discretion is not limited to certified information from a laboratory or other QA/QC information.[439] With respect to dissolved oxygen data, there are no controlling or applicable regulations relative to the Regional Board's review and acceptability of receiving water data. The SIP, on the other hand, provides as follows:

> When implementing the provisions of this Policy, the RWQCB shall use all available, valid, relevant, representative data and information, as determined by the RWQCB. The RWQCB shall have discretion to consider if any data are inappropriate or insufficient for use in implementing this Policy. Instances where

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435 LDOPA 2010, p. 6.

436 Permit, p. J-10.

437 DO Data Memo, Appendix B, Dempsey Email.

438 Hearing Transcript, p. 426:21-25.

439 See Staff Response to Comments, p. 53.

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> such consideration is warranted include, but are not limited to, the following: evidence that a sample has been erroneously reported or is not representative of effluent or ambient receiving water quality; questionable quality control/quality assurance practices; and varying seasonal conditions.[440]

Although not directly controlling, the SIP's provisions here explain well the Regional Board's discretion and responsibility with respect to data review. Further, unless specifically stated in the Permit, the Regional Board relies on section 1.3 of the SIP to conduct its reasonable potential analysis for both CTR and non-CTR constituents.[441] The SIP's reasonable potential analysis under section 1.3 incorporates the data provisions cited directly above.[442] Thus, the SIP's data provisions are instructive.

As indicated, and as is pragmatic, the Regional Board has the discretion to disregard or consider only data insufficient if there is evidence that a sample (or samples) is not representative of ambient receiving water quality.[443] In fact, the Regional Board has exercised this discretion on numerous occasions.[444] Clearly, the evidence provided above, including conclusions by the Regional Board's technical consultant, indicates that the DWR Hood data are not representative of ambient receiving water conditions for dissolved oxygen.

Despite the substantial evidence in the record calling into question the validity of the Hood data, or at the very least their use in calibrating the model, the Regional Board used this alleged "discrepancy" to conclude at times the river fails to comply with the water quality objective of 7.0 mg/L and, therefore, by extension, full nitrification of the effluent is required.

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[440] SIP, p. 5.

[441] See Permit, p. F-45.

[442] SIP, p. 6.

[443] See *In the Matter of the Petition of Environmental Law Fndn., et al. re City of Tracy Wastewater Treatment Plant*, State Board Order WQ 2009-0003 (May 19, 2009) (Tracy Order), p. 18; *In the Matter of the Petitions of Chevron U.S.A. Inc., et al.*, State Board Order WQO 2002-0011 (July 18, 2002), pp. 11, 19.

[444] See, e.g., Order No. R5-2009-0009 (Maxwell Public Utilities District), pp. F-29 to F-30; Order No. R5-2008-0184 (City of Colusa), p. F-20; Order No. R5-2008-0057 (Ironhouse Sanitary District), p. F-24; Order No. R5-2008-0053 (City of Placerville), p. F-23.

b. Full Nitrification Is Unrelated to Compliance With Dissolved Oxygen Objective

Setting aside the data quality issue discussed above, the compliance or non-compliance with dissolved oxygen objectives has nothing to do with granting or denying the ammonia mixing zones in question, and the Regional Board made no determination of any appropriate limit of oxygen demand to implement the numeric dissolved oxygen objective. The Regional Board provides no explanation or basis as to its their finding that the Sacramento River's occasional failure to comply with the dissolved oxygen objective of 7.0 mg/L at Hood results in the need for the adopted ammonia limits and full nitrification.[445] The Permit references the need, and the District agrees in part, that the District will need to reduce oxygen demanding constituents in SRWTP effluent to ensure ongoing consistent compliance with the Basin Plan water quality objective.[446] Accordingly, the District proposed seasonal UOD limits, as discussed above. Although the Regional Board rejected the District's proposed limits, no actual reason was provided to explain why the District's proposed UOD limits would not ensure compliance with the dissolved oxygen objective.[447] At most, the Regional Board claims that the Wet season ammonia limits should be the same as the Dry season limits.[448] Based on this logic, the Regional Board should have adopted a UOD limits of 169,000 lbs/day as the AMEL, and 234,000 lbs/day as the MDEL, both to be applied year-round. Instead, the Regional Board makes a huge and unsubstantiated leap to say that the District is using all of the river's assimilative capacity and therefore *full* nitrification is BPTC.

The Regional Board's illogical approach fails to comply with federal regulations, the SIP, and technical support documents for the adoption of water quality-based effluents limits. Federal regulations provide that when a permitting authority finds that a discharge has reasonable

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[445] See Permit, pp. F-56 to F-57, J-9 to J-10.

[446] Permit, p. J-9; Hearing Transcript, p. 226:8-11 (Testimony of Stan Dean, District Engineer, "Removing about half of the ammonia is [] prudent to address future conditions. Removing about half the ammonia comes from our proposal for the ultimate oxygen demand.").

[447] See Permit, p. J-10.

[448] See Permit, p. J-10.

potential to cause, or contribute to an in-stream excursion above the applicable numeric water quality criteria, the permit must contain effluent limitations for that pollutant.[449] In this case, the water quality criterion is the 7.0 mg/L water quality objective for dissolved oxygen.[450] Although dissolved oxygen is not technically a pollutant, the discharge of oxygen demanding substances can cause dissolved oxygen levels in the receiving water to fall below levels necessary to protect aquatic life beneficial uses.[451] The oxygen demanding substances at issue here are ammonia and BOD. Thus, assuming the Regional Board makes a finding of reasonable potential for dissolved oxygen, it should follow appropriate procedures to calculate an effluent limitation (or limitations) for oxygen demanding substances (i.e., UOD).[452] This has not occurred here.

First, there is no finding of reasonable potential directly related to dissolved oxygen.[453] Second, the Permit fails to include any discussion or calculation of an appropriate effluent limitation (or limitations) for oxygen demanding substances that is directly related to ensuring compliance with the dissolved oxygen objective far downstream in the receiving water.[454] At most, the Regional Board finds fault with the District's proposed Dry season UOD limit but does not offer or identify an alternative limit for UOD.[455]

Considering the Regional Board's failure to make any connection between full nitrification and compliance with dissolved oxygen objectives downstream of SRWTP's point of discharge, the Regional Board improperly used dissolved oxygen as an excuse to deny mixing zones for ammonia, or to find full nitrification is BPTC.

[449] 40 C.F.R. § 122.44(d)(1)(iii).

[450] Basin Plan, p. III-5.00.

[451] Permit, p. J-8.

[452] See 40 C.F.R. § 122.44(d).

[453] See Permit, pp. F-53 to F-86 (section identifies constituents with reasonable potential and dissolved oxygen is not included); see also Permit, Attachment G, p. G-1 (Summary of Reasonable Potential Analysis).

[454] See Order No. WQ 95-4, *supra*, pp. 21-22 (regional board's rationale for calculating permit limits must be expressed in the permit findings and fact sheet).

[455] Permit, p. J-10.

3. The Presence of Nitrosodimethylamines, a Nistrosoamine, Is an Improper Basis to Deny Ammonia Mixing Zones or Find That Full Nitrification Is Required

In addition to the other findings discussed above, the Permit includes a finding with respect to nitrosoamines to support the Regional Board's denial of mixing zones and by extension, requirement for full nitrification. Specifically, the Permit finds that the Discharger's effluent contains "nitrosoamines at levels that are greater than 100 times the primary MCL."[456] This finding is unsupported for several reasons, some of which are similar to those discussed previously.

First, there is no primary maximum contaminant level (MCL) for nitrosoamines in general, or the specific nitrosoamines such as nitrosodimethylamines (NDMA). DPH has published drinking water notification levels for NDMA and two other nitrosoamines. Notification levels are intended "to provide information to public water systems and others about certain non-regulated chemicals in drinking water that lack maximum contaminant levels."[457] Thus, by definition, notification levels are not MCLs.

Further, DPH considers notification levels to be advisory in nature and NOT enforceable standards.[458] Because, there exists no Primary MCLs for nitrosoamines, any finding suggesting otherwise is improper. Next, although the State Board has indicated that it might be appropriate to use notification levels in some instances, appropriate findings must be made when doing so.[459] No such findings have been made in this Permit. To the extent the Regional Board intended to reference notification levels versus MCLs in the Permit, it needed to include findings and supportive evidence explaining why it was appropriate and relevant to apply notification levels as water quality criteria. Again, the Permit includes no such findings.

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[456] Permit, p. F-57.

[457] Drinking Water Notification Levels and Response Levels: An Overview (Dec. 14, 2010), p. 2; see also *In the Matter of the Petition of Water Replenishment District of Southern California, et al.*, State Board Order WQ 2006-0001 (April 5, 2006) (*Petition for Water Replenishment District*), p. 2.

[458] Drinking Water Notification Levels and Response Levels: An Overview (Dec. 14, 2010), p. 4; see also *Petition of Water Replenishment District*, *supra*, p. 2.

[459] *Petition for Water Replenishment District*, p. 4.

With respect to NDMA, the California Toxics Rule (CTR) contains a criterion of 0.00069 μg/L for the protection of human health.[460] The Permit conducts a reasonable potential analysis for NDMA pursuant to the SIP's procedures and finds reasonable potential.[461] The District disagrees with the Permit's findings regarding lack of assimilative capacity and denial of a dilution credit.[462] However, the Permit otherwise follows the SIP procedures correctly and calculates effluent limitations for NDMA accordingly, and the Regional Board properly adopted a time schedule for NDMA in the TSO in accordance with relevant statutory provisions.[463]

However, the finding in question is, again, completely unrelated to whether or not it is appropriate to grant or deny mixing zones related to the narrative toxicity objective and U.S. EPA criteria for the protection of aquatic organisms. Further, the Regional Board's alleged connection between nitrosoamines and full nitrification is unfounded. The connection is based on a non-existent Primary MCL and represents an attempt to dictate the manner of compliance in violation of Water Code section 13360. Water Code section 13360 states, "[n]o waste discharge requirement or other order of a regional board, or the state board or decree of a court issued under this division shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner." Based on this provision, the District may comply with the effluents for NDMA in any lawful manner the District chooses, which may or may not include full and/or partial nitrification. As indicated in the Infeasibility Analysis for the SRWTP submitted to the Regional Board, the District intends to monitor influent data to determine if there are influent sources.[464] If so, the District will perform a comprehensive NDMA source identification study, which has not been conducted for the SRWTP service area because

[460] 40 C.F.R. § 131.38(b)(1), column D.

[461] Permit, pp. F-62 to F-63.

[462] See District's October 2010 Comments and Evidence Letter, pp. 47-49.

[463] Permit, pp. F-62 to F-63; Wat. Code, §§ 13300, 13385(j)(3).

[464] Sacramento Regional Wastewater Treatment Plant Infeasibility Analyses and Compliance Schedule Justifications (Aug 2010) (Infeasibility Analyses), p. 45.

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NDMA was not previously identified as a pollutant of concern.[465] The District will also explore treatment process optimization. Based on the results of these efforts, the District will be able to determine the best method to ensure compliance with NDMA limits by December of 2015.

Accordingly, any denial of mixing zones for ammonia based on nitrosoamines is inappropriate. Also, as with other issues discussed above, if the Regional Board desired to regulate based on nitrosamines it was required to comply with applicable law for development of WQBELs. And, any finding in the Permit that suggests the District must implement full nitrification to comply with effluent limitations for NDMA is also inappropriate and must be removed.

4. Finding for Denial of Mixing Zones and Requirements for Full Nitrification Based on Un-Published Draft U.S. EPA Criteria Are Not Appropriate

The Permit references the existence of *Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater* (Draft Ammonia Criteria) as one reason for denying dilution credits and requiring full nitrification.[466] Any reliance on the Draft Ammonia Criteria is misplaced because it is a draft and not available for use in a regulatory setting. In an email exchange between Regional Board staff and U.S. EPA staff that is part of the Permit record, U.S. EPA indicated that the Draft Ammonia Criteria would not be published until 2011. At this time, the science has not been completed and the Draft Ammonia Criteria have not been peer reviewed.[467] Both are critical steps to determining the appropriateness and validity of the Draft Ammonia Criteria. Further, U.S. EPA cautioned that the Draft Ammonia Criteria must be published by U.S. EPA and adopted by the states into their water quality standards ". . . before the value is adopted, legally binding and useful in permits."[468]

Regional Board staff stated that it has the discretion to use the Draft Ammonia Criteria to interpret the Basin Plan's narrative toxicity objective.[469] However, when using criteria to interpret

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[465] Infeasibility Analyses, p. 45.

[466] Permit, pp. J-3 to J-4; see Staff Response to Comments, p. 25.

[467] Staff Response to Comments, p. 25.

[468] Email Exchange Between Kathleen Cole Harder, RWQCB, and Lisa Foersom Huff, U.S. EPA (Aug. 2, 2010).

[469] Staff Response to Comments, p. 25.

narrative water quality objectives, the Regional Board must make appropriate findings and comply with the applicable processes under state and federal law discussed previously.[470] The Permit does not include any findings to this effect and does not claim to do so.[471]

Even if the Draft Ammonia Criteria were applicable, there would still be insufficient reason to deny a dilution credit to discharges from the SRWTP. The Regional Board approved the District's model and mixing zones for chronic criteria.[472] The Draft Ammonia Criteria includes a chronic criterion.[473] Further, in a year-long nutrient study conducted by the Regional Board, "[a]mbient concentrations never exceeded the criteria."[474] Thus, assimilative capacity for ammonia is available even if the more stringent Draft Ammonia Criteria are inappropriately used.

The District notes and agrees with the statements in the Permit that it is appropriate to use U.S. EPA ammonia criteria to interpret the narrative toxicity objective. As indicated in Attachment J of the Permit, "when the approved mixing zones are considered, [the SRWTP's discharge] is in compliance with current USEPA acute and chronic ammonia criteria."[475] Conversely, it is inappropriate to use the Draft Ammonia Criteria as a basis for denying dilution credits or mixing zones for ammonia because the draft criteria are not approved by U.S. EPA.

Further, it is important to properly characterize the Draft Ammonia Criteria and their relevance for evaluating impacts on POD species. Specifically, the Draft Ammonia Criteria are more stringent than the adopted U.S. EPA ammonia criteria due to the consideration of ammonia toxicity to sensitive freshwater mussels. In fact, the Draft Ammonia Criteria are proposed to be bifurcated into separate categories, depending on the presence or absence of sensitive freshwater mussel species in a water body. The "without mussels present" criteria, which are driven by the

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[470] See State Board Order No. WQ 95-4, *supra*, p. 13 (rationale for more stringent limits must be explained in the permit and be supported by evidence in the record).

[471] Staff Response to Comments, p. 25.

[472] Letter from Kenneth D. Landau to Mary K. Snyder, Acceptance of Sacramento Regional County Sanitation District's Dynamic Mathematical Model for Use in NPDES Permit Renewal for the Sacramento Regional Wastewater Treatment Plant (April 2, 2009) (Dynamic Model Acceptance Letter); Permit, pp. F-35 to F-36.

[473] Permit, p. J-3.

[474] Permit, p. J-3.

[475] Permit, p. J-1.

protection of sensitive fish species, are no more stringent than the U.S. EPA ammonia criteria, which are currently driven by the protection of sensitive fish species such as rainbow trout and salmonids. In other words, with respect to the protection of Delta POD fish species, there is little difference between the U.S. EPA ammonia criteria and the Draft Ammonia Criteria. Therefore, evaluations of ammonia toxicity to Delta fish using the U.S. EPA ammonia criteria will continue to provide meaningful and pertinent conclusions going forward, regardless of the status of the finalization and adoption of the Draft Ammonia Criteria.

5. Full Nitrification Is Not Justified Via State Board Resolution No. 68-16

The Permit also includes a finding that, "[t]he Discharger must fully comply with Resolution No. 68-16 that requires Best Practical Treatment and Control, which for this discharge includes nitrification and denitrification of their wastewater."[476] For the reasons described in section VIII, *post*, the District disagrees that State Board Resolution No. 68-16 requires implementation of those advanced treatment requirements, including full nitrification. As discussed below, State Board Resolution No. 68-16 is designed to protect high-quality waters. However, it is not a zero-degradation policy. It generally requires that when permitting degradation, the Regional Board is required to ensure that additional degradation occurs pursuant to limits that require BPTC and that the additional degradation is to the maximum benefit to the people of the state. The determination of BPTC takes into consideration a number of factors including the consideration of alternatives. In this case, the Permit fails to consider alternatives with respect to partial nitrification that would result by adopting UOD limits as being BPTC. As discussed in section VI.B.2, *supra*, partial nitrification would ensure protection of beneficial uses, which is the primary goal of State Board Resolution No. 68-16.

Further, like with all of the other findings designed to support the Regional Board's denial of mixing zones for ammonia, the finding does not bridge the analytical gap between the evidence and the Regional Board's ultimate determination (i.e., no mixing zones), and the finding is not supported by evidence in the record. Accordingly, the finding is improper and void.

[476] Permit, p. F-57.

VII. THE PERMIT IMPROPERLY INCLUDES FINAL EFFLUENT LIMITATIONS AND DENIES A MIXING ZONE FOR NITRATE BASED ON ALLEGED AND UNEXPLAINED FAR FIELD IMPACT

The Permit includes an AMEL for nitrate of 10 mg/L derived from application of the Primary MCL of 10 mg/L (as nitrogen) at the end-of-pipe without the consideration of dilution.[477] The Regional Board denied the granting of a human health mixing zone for nitrate, determining that "a human health mixing zone for nitrate does not meet the mixing zone requirements of the SIP."[478] As with ammonia, the Permit refers to three SIP criteria that were determined not to be met: the Regional Board determined the mixing zone would "compromise the integrity of the entire water body, adversely impacts biologically sensitive or critical habitats, and produce undesirable or nuisance aquatic life."[479]

As in the case of ammonia, the denial of a nitrate mixing zone is flawed in multiple respects. First, the denial has nothing to do with the merits of a human health mixing zone. Second, the Permit findings fail to "bridge the analytic gap between the raw evidence and ultimate decision or order."[480] In this regard, the Permit is even more deficient for nitrate than it is for ammonia. In particular, as a prelude to determining that the SIP criteria are not met, the Permit states that "elevated nitrogen discharges from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta[.]"[481] But there are *no findings whatsoever* to support this conclusion. In other words, for nitrate or nitrogen, there is no equivalent to the ammonia "appendix" (Appendix J of the Permit). To the extent Appendix J even discusses nitrogen, the appendix states that effects are "not known."[482] There simply is no linkage of any raw evidence to the determination to deny a mixing zone for nitrate. Third, even if there were a finding linking evidence to the denial, there would be no basis

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[477] Permit, p. 14 (Table 6); pp. F-44 to F-45, F-72.

[478] Permit, pp. F-44 to F-45.

[479] Permit, p. F-45. The September Tentative Permit circulated for public comment did not include a determination to deny a mixing zone for nitrate under the SIP. (See November Redline Tentative Permit, p. F-45 to F-46.)

[480] *Topanga, supra,* 11 Cal.3d, pp. 506, 515.

[481] Permit, p. F-45.

[482] Permit, pp. J-7 to J-8.

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to conclude that an effluent limit of 10 mg/L AMEL is necessary to prevent some impact far downstream. In this regard, if impacts related to unspecified downstream uses existed, the MCL for nitrate is not relevant. The Regional Board must implement the applicable narrative water quality objective to derive a WQBEL. The Regional Board has not done so. Overlying all of the above, the Regional Board did not consider the cost of denying the mixing zone or lack of harm associated with a mixing zone.[483]

A. An Effluent Limitation Equal to the MCL Is Unnecessary to Protect MUN Use

The Basin Plan Chemical Constituents Objective incorporates MCLs by reference.[484] The Permit correctly states that if the SRWTP is required to nitrify for ammonia reduction, nitrate concentrations will increase, and as a result of the Permit requirements for ammonia, nitrate in undiluted effluent would exceed the Primary MCL for nitrate of 10 mg N/L.[485]

The Permit explicitly acknowledges that there is assimilative capacity and dilution available for compliance with the Primary MCL.[486] Regional Board staff also stated: "there is sufficient dilution available in the Sacramento River that the river after mixing [with a nitrified effluent] will not exceed the nitrate drinking water standard."[487] The Permit correctly states that there are no known drinking water intakes within the immediate vicinity of the discharge. The closest downstream drinking water diversion is the Barker Slough Pumping Plant, 40 miles distant, which diverts water from Barker Slough into the North Bay Aqueduct.[488] The North Bay Aqueduct supplies water to remote drinking water intakes. Modeling completed by the District indicates that the Sacramento River, and therefore the SRWTP discharge, has little influence on the quality of water in Barker Slough.[489] The Permit properly notes that the effluent will be

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[483] See *In the Matter of the Petition of Yuba City*, State Board Order WQO 2004-0013 (July 22, 2004), p. 12 (regional board must "fully consider information in the record, the high cost to meet the effluent limitations without allowing . . . dilution credit, and the lack of evidence of any harm associated with such a mixing zone.").

[484] Basin Plan, p. III-3.00.

[485] Permit, pp. F-44, F-72.

[486] Permit, p. F-44.

[487] Staff Report, p. 20.

[488] Permit, pp. F-36, F-38, F-40.

[489] District's October 2010 Comments and Evidence Letter, p. 55; see Permit, pp. F-30 to F-40.

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sufficiently diluted at downstream drinking water diversion points to meet the Primary MCL.[490] In fact, the Primary MCL will be met by a large margin.

In sum, it is beyond dispute that there is no need for an end-of-pipe limit equal to the MCL to protect the Municipal (MUN).

B. Denial of a Mixing Zone for Nitrate Is Improper

1. The Denial Is Not Based on Findings or Compliance With Regulatory Requirements

In consideration of the above conclusions with respect to the Primary MCL for nitrate, the obvious question is: why is the Permit's final effluent limitation equal to the MCL of 10 mg/L? The Permit does not say. And, there are no findings to support the limit.

As discussed above, the Permit contains a solitary statement asserting the mixing zone is denied because of negative effects of nitrogen "far downstream" within the Delta. What are the negative effects? Where? The Permit does not say. There is no finding linking, or attempting to link, any evidence to any adverse effect.

The Permit findings do refer to hypotheses concerning nitrogen and nitrogen:phosphorous ratios in the Delta.[491] However, the Regional Board made no finding whatsoever linking any evidence to a conclusion that there is a problem with nitrogen concentrations in the Delta, or N:P ratios.[492] The District has addressed these issues elsewhere, and indeed a lowering of N:P ratios could potentially have *adverse* effects.[493] But the critical point is that no adverse impact is even identified in the Permit. Similarly, there is a statement in the Permit that unidentified recent studies have indicated "a possibility" of nitrate toxicity to aquatic organisms.[494] However, there is no finding of any such impact at any nitrate concentration.

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[490] Permit, p. F-44.

[491] Permit, p. J-7.

[492] Permit, pp. J-7 to J-8.

[493] See District's October 2010 Comments and Evidence Letter, pp. 52-55; Engle Written Testimony, p. 4; see also Hearing Transcript, pp. 201:15-202:23; SRCSD Hearing Exhibits, PowerPoint slides 22-23; see section VI.B.1.c.i.(d), *supra*.

[494] Permit, pp. F-71 to F-72.

Of course, were it the case that nitrogen resulted in undesirable changes in algae composition or toxicity (hypotheses described on pages F-71 to F-72 and J-7 to J-8 of the Permit but not endorsed in the Permit), the Basin Plan narrative water quality objective for toxicity or biostimulatory substances would be implicated.[495] In that scenario, the Regional Board would be obliged to determine reasonable potential and establish effluent limits in accordance with applicable law including 40 C.F.R. section 122.44(d)(1)(vi) and the Basin Plan, as discussed in sections VI.A.2, VI.B.1.b.iii, *supra*, of this Statement of Points and Authorities.[496]

2. For the Same and Additional Reasons, Denial Based on the SIP Was Improper

In this case, the Regional Board improperly denied a human health mixing zone and appropriate dilution credits for nitrate, determining that three of the eleven SIP criteria were not met: (1) compromise the integrity of the entire water body; (2) adversely impact biologically sensitive or critical habitats; and (3) produce undesirable or nuisance aquatic life.[497] As described below, the Regional Board's denial of a nitrate human health mixing zone based on these criteria is improper for several reasons, including that: the SIP is not applicable, there exists no evidence that allowing a mixing zone for nitrate will harm aquatic life or other beneficial uses, and the Permit fails to include any explanation, findings, or evidence as to how a human health mixing

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[495] See section VI.A.2, *supra* (quoting Basin Plan narrative objectives for Biostimulatory Substances and Toxicity); see also Basin Plan, p. III-7.00 (narrative Taste and Odors Objective).

[496] The Staff Report and Staff Response to Comments suggest that nitrate causes algal growth and that excessive algal growth can impart undesirable tastes and odors. (See Staff Report, p. 22; Staff Response to Comments, p. 28.) There was also hearing testimony on these subjects, but, as with the Tentative Permit upon which parties commented, not a word in the Permit or its findings supports a determination to deny mixing zones on this basis. In addition, some of this staff material outside the Permit references alleged effects not in the mixing zone or even "within the Delta," but in areas to which water is exported from the Delta. The Staff Report and Staff Response to Comments are not findings of the Regional Board and are not incorporated into the Permit. (See State Board Order No. WQ 95-4, pp. 21-22 [regional board rationale must be expressed in permit findings and fact sheet].) Permit section II.D incorporates Attachments A-K. (Permit, p. 6.) (The District notes that the reference to Attachment "K" is an editing oversight [see November Redline Tentative Permit, p. 3].) There are no findings at all in the Permit or Fact Sheet related to any of these issues or that would support that the nitrate limit of 10 mg/L at the end-of-pipe is necessary to ensure compliance with the narrative biostimulatory substances, or taste and odor objectives, in the Basin Plan. Again, if any narrative objective is to be implemented, the Regional Board must comply with applicable law in determining reasonable potential and establishing numeric limits to implement the narrative objective. Moreover, the link between algal growth and taste and odor is not supported by published literature, which is explained in detail in the Expansion ADA, pp. 4-22 to 4-25.

[497] Permit, pp. F-44 to F-45.

zone for nitrate adversely affects beneficial uses in any way or would not comply with the three SIP criteria if appropriately applied.

a. The SIP Mixing Zone Criteria Do Not Apply

The SIP includes requirements for dilution credits and mixing zones for CTR-based (i.e., priority pollutant) human health criteria. The SIP states: ". . . in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a RWQCB basin plan, the RWQCB may grant mixing zones and dilution credits to dischargers in accordance with the provisions of this section."[498] Nitrate is not a priority pollutant regulated in the CTR, nor is application of the Primary MCL based on the narrative toxicity objective for aquatic life in the Basin Plan.[499] Thus, the development of effluent limits (including the consideration of dilution) is not subject to the SIP.[500]

The Basin Plan includes mixing zone provisions that are applicable to *non-priority* pollutant criteria/objectives. The Basin Plan states that the Regional Board may designate mixing zones provided that, "the discharger has demonstrated to the satisfaction of the Regional Water Board that the mixing zone will not adversely impact beneficial uses."[501] Further, when determining the size of a mixing zone pursuant to the Basin Plan's policy, the Regional Board is to consider the applicable procedures and guidelines in the TSD.[502] The Permit states that the Regional Board considered the Basin Plan policy and TSD procedures and guidelines.[503] However, the Regional Board's determination for nitrate was based specifically on three criteria from the SIP, not the Basin Plan's provisions.

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498 SIP, p. 15.

499 See 40 C.F.R. § 131.38(b)(1); see also Permit, pp. F-71 to F-72.

500 See SIP, p. 15.

501 Basin Plan, p. IV-16.00.

502 Basin Plan, p. IV-16.00.

503 Permit, p. F-40.

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b. Even Assuming the SIP Applies, the Regional Board Did Not Properly Determine That SIP Criteria Are Not Met

Contrary to the Permit's unsubstantiated determination, a human health mixing zone for nitrate does not compromise the integrity of the entire water body. Based on the District's *Sacramento River Harmonic Mean Mixing Zone Report* (June 2010),[504] the discharge is completely mixed approximately three miles downstream. Accordingly, the Permit allocates dilution credits of 56:1 for human carcinogen criteria, dilution credits of 29:1 for non-human carcinogen criteria, and identifies a human health mixing zone of three miles.[505] In comparison, the Sacramento River extends over 40 miles downstream from the discharge to the San Francisco Bay, and the nearest downstream drinking water intake is the Barker Slough Pumping Plant, also approximately 40 miles downstream.[506] The TSD provides guidance on determining effects on the water body as a whole: "[i]f the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that they do not impinge on unique or critical habitats."[507] As with the acute and chronic mixing zones for ammonia discussed above, the human health mixing zone here is small in contrast to the river segment of 40 miles. Moreover, there would be no adverse effect on MUN use from the Sacramento River or Delta. Thus, a human health mixing zone for nitrate will not compromise the integrity of the entire water body. With respect to the remaining two criteria, related to sensitive habitats and nuisance aquatic life, the Regional Board's determinations that the criteria are not met is also unsupported. The Permit provides no reference or explanation or findings linking evidence to its determinations as to how the human health mixing zone for nitrate would adversely impact sensitive or critical habitats. Similarly, there are no findings in the Permit linking any evidence to a determination that the human health mixing zone for nitrate

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[504] SRCSD, *Sacramento River Harmonic Mean Mixing Zone Report*, Larry Walker Associates (June 2010).

[505] Permit, pp. F-38 to F-39.

[506] Permit, pp. F-38, F-40.

[507] TSD, p. 34.

requested by the District will produce undesirable or nuisance aquatic life. If this situation existed, the Regional Board would be obliged to determine reasonable potential and appropriate effluent limits implementing the narrative toxicity or biostimulatory substances objective in accordance with federal regulations[508] and the Basin Plan.

C. The Argument for Denitrification to Satisfy State Board Resolution No. 68-16 Is Wholly Inadequate

For the reasons described above and in section VIII, *post*, the District disagrees that Resolution No. 68-16 requires implementation of denitrification requirements.

Nitrate discharge above 10 mg/L AMEL would not cause pollution or nuisance, and there is no basis in the Permit or otherwise to conclude denitrification would provide maximum benefit to the people of the state. Significantly, the Permit does not attempt to explain otherwise. The maximum benefit determination requires a balancing of costs and benefits. The record clearly shows that the Regional Board does not know whether a benefit from denitrification would occur. The record also shows that denitrification would be extremely costly. Therefore, and assuming state and federal antidegradation policies apply,[509] there is no showing of need for denitrification as BPTC.

D. Considerations Related to Remand

In paragraph 6.D of this Petition (preceding this Statement of Points and Authorities) the District requests, among other things, that the State Board vacate the improper effluent limitations for nitrate, and remand with direction to adopt limitations if and as necessary, based on the MCL for nitrate with appropriate allowance of a mixing zone. Whether effluent limitations will be necessary depends upon the outcome of other permitting issues. If, for example, the Regional Board determined that effluent limitations for oxygen demanding substances would likely lead to nitrate levels at end-of-pipe excess of the MCL, a mixing zone would be allowed.

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[508] 40 C.F.R. § 122.44(d)(1)(vi).

[509] See section VIII, *post*.

VIII. THE REGIONAL BOARD MISAPPLIED AND MISINTERPRETED ANTIDEGRADATION POLICIES CONTRARY TO LAW AND STATE POLICY

The Permit includes a brief section under the heading "Satisfaction of Antidegradation Policy."[510] Here, in an unprecedented approach to the renewal of a permit for a municipal discharger, the Regional Board undertook to support stringent new permit requirements in the absence of *any* substantive information that the discharge will degrade baseline water quality. The requirements are purportedly based on a new antidegradation "analysis," which, as discussed below, is incomplete, conclusory, and unsupported in fact or law.

Under the applicable "antidegradation" policies, and in practice, regional boards determine whether to allow new discharges or expansions of discharge. Neither circumstance is present here. Instead, the policies have been converted to a shotgunning of superficial arguments for a level of treatment or effluent quality for a previously permitted discharge.

The District fully recognizes that the Regional Board can impose increasingly stringent requirements on a permitted discharge. That is what occurs with water quality-based permitting and the adoption of WQBELs. In this Permit, however, logic, science, and law are lacking as a basis for the WQBELs adopted, and the Regional Board sought to impose the same outcomes in a different way. If this is to be the future of the policies, the State and Regional Boards can do away with water quality planning and simply confirm that there is open-ended authority to dictate outcomes in the regulatory permitting process.

In this section, the District demonstrates that the antidegradation policies were not triggered by the renewal of the Permit. Furthermore, the District explains that even if the policies were triggered, the analyses and conclusions in the Permit are erroneous.

[510] Permit, pp. F-93 to F-99. Certain conclusions set forth in this section of the Permit, such as those regarding BPTC, are repeated elsewhere in the Permit (e.g., Attachment J).

A. Renewal of the District's Permit Did Not Trigger State or Federal Antidegradation Review

The Regional Board determined that the renewal of the District's permit required an antidegradation analysis.[511] This conclusion is contrary to State Board orders and policy, relevant guidance, and the Regional Board's own application of antidegradation policies. Application of the policy is triggered when a regional or state board action will lower existing high quality water.[512] Before approving any reduction in water quality, or any activity that would result in a reduction in water quality, "the Regional Board must first determine that the change in water quality would not be in violation of State Board Resolution No. 68-16 or the federal antidegradation policy."[513] This includes consideration of changes that have already occurred *if they have not previously been reviewed for consistency with those policies*.[514]

Further, State Board guidance clarifies that the policy does not require "antidegradation" analysis when existing water quality will not be reduced by the proposed action.[515] Existing water quality includes water quality *already permitted or authorized*, even if the permitted degradation has yet to occur.[516]

With respect to the federal antidegradation policy, "[t]he first step in any antidegradation analysis is to determine whether or not the proposed action will lower water quality . . . . If the action will not lower water quality, no further analysis is needed and EPA considers 40 CFR 131.12 to be satisfied."[517] State guidance confirms this approach: "The three-part test set forth in

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[511] Permit, p. F-93. State Policy is set forth in the "Statement of Policy With Respect to Maintaining High-Quality Waters in California." (State Board Resolution No. 68-16.) The federal antidegradation policy is codified in regulation. (40 C.F.R. § 131.12.) For convenience, the policies are referred to herein as the state and federal antidegradation policies.

[512] *In the Matter of Petitions of the County of Santa Clara, et al.*, Order No. WQ 86-8 (Resolution No. 68-16 "sets forth the circumstances under which *change* to existing high quality water will be allowed"), p. 28, emphasis added.

[513] *In the Matter of the Petition of Rimmon C. Fay*, Order No. WQ 86-17, p. 17.

[514] *In the Matter of Petitions for Reconsideration of Water Quality Certification for the Re-operation of Pyramid Dam*, Order WQ 2009-0007, p. 12.

[515] Antidegradation Policy Implementation for NPDES Permitting, Administrative Procedures Update 90-004 (APU 90-004), p. 2.

[516] APU 90-004, p. 4.

[517] Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. § 131.12 (June 3, 1987), pp. 3-4.

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the federal antidegradation policy is triggered by reduction in surface water quality. The first-step in analyzing the requirements of the federal antidegradation policy as applied to a particular activity is to determine if the activity will lower surface water quality; only if there is a reduction in water quality must the three-part test be applied to determine if the activity may be permitted."[518]

The Regional Board acknowledged that antidegradation analyses were completed prior to the granting of the 181 mgd discharge capacity.[519] The Permit does not allow for an increase in flow or mass for any constituent of concern, except cyanide.[520] Because compliance with the policies was previously considered, and the Permit does not allow for a reduction in water quality, the requirement of an antidegradation analysis under the state and federal antidegradation policies has not been triggered.

The Regional Board's sole basis for asserting that a new analysis should be conducted is that conditions in the Delta have changed.[521] Yet, nothing in the policy or associated guidance requires a new analysis based on subjective evaluation of whether a "change" in some condition has occurred since the time a discharge was originally authorized. The Regional Board has attempted to open a door that does not exist. Moreover, it is not the Regional Board's practice to subject existing permitted discharges to complete antidegradation analyses; instead, such review

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[518] Memorandum to Regional Board Executive Officers from William R. Attwater, Chief Counsel, Federal Antidegradation Policy (Oct. 7, 1987) (Attwater Memo re: Federal Antidegradation Policy), p. 3. It is unlawful for the Regional Board to apply or use a policy as a basis of regulation unless the policy has first been proposed, adopted, and approved in accordance with the Administrative Procedures Act (APA). (Gov. Code, § 11340.5.) The antidegradation policies have not been adopted to require analysis for an existing discharge, and application for that purpose would require compliance with the APA.

[519] Permit, p. F-93.

[520] Permit, p. F-9-3. With respect to cyanide, the District performed and submitted a dynamic model, which represents a more accurate picture of mixing zone concentration and therefore supports adoption of the specific Permit limit. (Permit, pp. F-41 to F-42.) The District also provided antidegradation analysis which considered the impacts of increased cyanide discharges at 181 and 218 mgd. That analysis determined that the minor incremental change in cyanide, even at 218 mgd, was consistent with state and federal antidegradation policies.

[521] Permit, p. F-93. Though not clearly delineated, the referenced change is presumably the decline of Delta fish populations. The issue, however, is when and how the policy applies. Moreover, there is no reference in the Permit to any "changed conditions" related to many of the constituents the Permit proposes to regulate more stringently than in the past, including the constituents regulated under the Permit's filtration requirements.

is triggered by the authorization of a new discharge or significant increase in flow rates.[522] Nor is a different policy or practice applicable to Delta dischargers. The recently adopted permit for the City of Rio Vista, which also authorizes discharges to the Sacramento River within the Delta, finds that because the Order did not allow for an increase in flow or mass of pollutants, a complete antidegradation analysis was not necessary.[523]

The Permit stands alone in its approach to antidegradation. In the absence of any basis to deviate from existing policy and practice, the only reasonable inference to be drawn is that the Regional Board began with the decision to dictate advanced treatment and invoked antidegradation in support of the conclusion already reached.

B. The Regional Board Applied the Wrong Baseline

On May 20, 2009, the District submitted an Expansion ADA to support the District's application for a discharge of 218 mgd.[524] By letter dated June 11, 2010, the District withdrew its request for expansion.[525] Once the District's request for expansion was withdrawn, the Expansion ADA and its analysis were no longer required. However, the Regional Board relied upon the Expansion ADA to develop an argument that the existing discharge is degrading the receiving water.[526] As detailed below, this analysis is flawed for several reasons.

State Board guidance provides that, "[b]aseline quality is defined as the best quality of the receiving water that has existed since 1968 when considering Resolution No. 68-16, or since 1975

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522 See, e.g., Order No. R5-2010-0099 (City of Galt), p. F-51; Order No. R5-2007-0069 (El Dorado Irrigation District), p. F-55.

523 Order No. R5-2010-0081 (City of Rio Vista) p. F-56. Neither the findings nor the Fact Sheet suggest that the relatively small magnitude of the Rio Vista discharge was a consideration in this permit determination. Nor does the size of a discharge control whether the policies are triggered.

524 Larry Walker Associates, Antidegradation Review for Proposed Wastewater Treatment Plant Discharge Modification (Feb. 2005 and May 20, 2009); Expansion ADA. An earlier antidegradation analysis was prepared in 2005. Both analyses examined the impacts of a proposed capacity expansion and are no longer required for the Permit, which does not allow any increase in discharge.

525 Letter dated June 11, 2010, from Mary Snyder, District Engineer, SRCSD, to Pamela Creedon, Executive Officer, RWQCB re: Request for Change in Permitted Capacity for the Sacramento Wastewater Treatment Plant (SRWTP); see Permit, p. 4. The Permit incorrectly attributes the withdrawal to a pending legal challenge to the District's EIR for its 2020 Master Plan. (Permit, p. F-94.) The reasons for withdrawal of the request for increased permitted capacity are stated in the referenced letter to the Executive Director of the Regional Board from the District Engineer.

526 Permit, p. F-94. ("[T]he ADA was used by Central Valley Water Board Staff to evaluate the impacts of the discharge at the permitted discharge flow of 181 mgd.")

under the federal policy, *unless subsequent lowering was due to regulatory action consistent with state and federal antidegradation policies*. If poorer water quality was permitted, the most recent water quality resulting from permitted action is the baseline water quality to be considered in any antidegradation analysis."[527] Undeterred by this unambiguous direction, which it has previously followed, and fully aware that the Permit does not allow for an increase in pollutant loading, the Regional Board staff invented a new trigger for antidegradation by calculating the amount of reduced assimilative capacity resulting from the permitted discharge to determine if this "increased" pollutant loading was significant.[528] In other words, the Regional Board established a unique baseline for the Sacramento region, one that has not been applied elsewhere in the state and is contrary to state policy.

Despite the fact that no increase in capacity was being requested or considered, Regional Board staff used information provided in the Expansion ADA to evaluate impacts at the currently permitted discharge flow of 181 mgd.[529] The Regional Board evaluated the District's current loading to determine whether the discharge "degrades" receiving water quality.[530] The baseline for the District and the District alone, which has served millions of people and discharged to the river for decades, was set at a discharge rate of zero—as though the facility and Sacramento region did not exist prior to issuance of this Permit. The Permit improperly characterizes baseline water quality by comparing the District's already-permitted effluent quality to background river concentrations (i.e., mean Sacramento River concentration at monitoring location RSWU-001 upstream of the SRWTP discharge) to calculate the percent of assimilative capacity used. Such an approach is unprecedented and inconsistent with state policies and guidelines. In fact, the Permit's approach treats the Sacramento region differently from every other region and

[527] APU 90-004, p. 4. For examples of other Permits applying the permitted discharge as the baseline, see Order No. R5-2009-0095 (City of Manteca), pp. F-59 to F-61; Order No. R5-2010-0099 (City of Galt), pp. F-51 to F-54.

[528] Permit, p. F-94.

[529] Permit, p. F-94.

[530] Permit, pp. F-93 to F-94.

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discharger in the state, where the test has consistently been whether the Permit authorizes any additional degradation above existing conditions.[531]

C. There Is No Evidence the District's Discharge Is Significantly Degrading Receiving Water

Assuming the antidegradation policies apply, the Regional Board erred in applying the Expansion ADA to find that the existing permitted discharge is degrading the receiving water and therefore certain specified levels of treatment are required, and in failing to set forth findings that connect evidence to the conclusions.[532] In concluding that the District's discharge is causing significant degradation, the Regional Board failed to "bridge the analytic gap" between supporting facts and its ultimate decision.[533] Regulatory agencies are required to set forth findings that link their ultimate conclusions to the evidence. This legal requirement reduces "the likelihood that [an] agency will randomly leap from evidence to conclusions" and is critical to ensure participating parties that the decision rendered is reasoned and equitable.[534] As the California Supreme Court has noted, clear articulation of "the relationships between evidence and findings and between findings and ultimate action" discloses the analytic route the administrative agency "traveled from evidence to action." [535] The Legislature "contemplated that the agency would reveal this route."[536]

U.S. EPA has provided guidance for conducting antidegradation reviews for high quality waters (Tier 2) pursuant to federal policy.[537] The King Memorandum discusses significance

[531] See APU 90-004, p. 4.

[532] Information in the Expansion ADA actually supports a finding that the current permitted discharge does not significantly impact water quality in the Sacramento River. The Expansion ADA showed no significant impact to downstream water quality, with the exception of recognition of a need for limitation of oxygen demand in the future. (Larry Walker Associates, Antidegradation Review for Proposed Wastewater Treatment Plant Discharge Modification (Feb. 2005); Expansion ADA.)

[533] See *Topanga, supra,* 11 Cal.3d, pp. 506, 515.

[534] *Topanga, supra*, 11 Cal.3d, p. 516.

[535] *Environmental Protection Information Center v. California Department of Forestry and Fire Protection* (2008) 44 Cal.4th 459, 516.

[536] *Environmental Protection Information Center v. California Dept. of Forestry and Fire Protection, supra,* 44 Cal. 4th, p. 516.

[537] Memorandum from Ephraim S. King, Director, Office of Science and Technology, U.S. EPA, Office of Water, to Water Management Division Directors, Regions 1-10 (Aug. 2005) (King Memorandum).

thresholds for use by states and tribes, measured by use of available receiving water assimilative capacity, that trigger a complete antidegradation analysis including consideration of social and economic impacts. The intent of Tier 2 protection "is to maintain and protect high quality waters and not to allow for any degradation beyond a *de minimis* level without having made a demonstration, with opportunity for public input, that such lowering is necessary and important."[538] A significance threshold of a ten percent reduction in available assimilative capacity is "workable and protective in identifying those significant lowerings of water quality that should receive a full Tier 2 antidegradation review, including public participation."[539] In the Staff Response to Comments, staff dismisses the King Memorandum as non-binding.[540] The point, of course, is not that the memorandum is controlling but that it is relevant and has been consistently followed by the Regional Board since issued. In any event, the Permit fails to explain or document why the ten percent threshold that has been consistently applied in Central Valley Region permits was not applied to the District's permit.[541]

The Permit purports to portray the estimated percent of assimilative capacity of the receiving water used by the District with respect to its current discharge.[542] Approximately $1 billion in new capital costs (and tens of millions in annual operation and maintenance) are associated with treatment to achieve proposed new effluent filtration requirements including total coliform, yet Table F-18 of the Permit does not address coliform or assimilative capacity for

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[538] King Memorandum, p. 1.

[539] See *Ohio Valley Environmental Coalition v. Horinko* (S.D. W.Va. 2003) 279 F.Supp.2d 732, 779 (upholding U.S. EPA's approval of West Virginia antidegradation implementation procedures that include a *de minimis* provision of up to ten percent of the available assimilative capacity for any given pollutant); see also *Kentucky Waterways Alliance v. Johnson* (6th Cir. 2008) 540 F.3d 466, 486 (court found that "[b]ased on these authorities' [referring, in part, to the King Memorandum] . . . I would find that, in order to be considered *de minimis*, . . . a categorical exemption from Tier II review must not permit any individual discharge that would destroy more than ten percent of a Tier II water's available assimilative capacity."). In the Permit, the Regional Board appears to have followed this guidance to a point. Table F-18 of the Permit indicates that the ten percent threshold is exceeded for only three constituents. At most, a Tier 2 analysis *may be* triggered for chlorpyrifos, bromodichloromethane, and ammonia. Even so, this would mean only that findings with respect to socioeconomic impacts must be made to allow the degradation—not that advanced treatment is required.

[540] Staff Response to Comments, pp. 35-36.

[541] The Regional Board has characterized the ten percent threshold as serving "a key objective" of antidegradation review. (Order No. R5-2007-0069, *supra*, p. F-57.)

[542] Permit, pp. F-98 to F-99, Table F-18.

coliform. The information in Table F-18 does not support a finding that the discharge degrades water quality with respect to total coliform or other constituents relevant to filtration requirements.[543] Similarly, the Permit imposes major new capital and operation and maintenance costs for nitrate removal, but Table F-18 shows that the current discharge utilizes zero percent of assimilative capacity for nitrate.[544] Notably, any "degradation" attributable to nitrate would occur only after the District fully nitrifies *in response to* the Permit. The information in Table F-18 does not plausibly provide support for the Regional Board's overly broad generalization regarding "degradation," let alone provide the analysis required to satisfy *Topanga*.

Nor does the Permit fare better in the case of other parameters. With the exception of ammonia, bromodichloromethane, and chlorpyrifos, the Regional Board's analysis shows that the District's current discharge at its current level of treatment utilizes no more than ten percent of assimilative capacity for all other constituents listed.[545] Even the current loadings of bromodichloromethane, and ammonia in the summer months, barely exceed ten percent.[546] For many constituents, the actual use of assimilative capacity is significantly lower than ten percent and typically is below one percent. As pointed out in the District's Expansion ADA, incremental changes of this small magnitude are not measurable for many of these parameters.

Thus, it is clear the ten percent threshold sanctioned by U.S. EPA guidance and consistently applied by the Regional Board would not warrant an antidegradation analysis for the vast majority of constituents. Undaunted, the Regional Board simply abandoned the threshold and instead selected—arbitrarily—ten constituents it deems to have the greatest impact on receiving water quality. The Permit identifies ammonia, salinity (in the forms of EC, TDS, and chloride), copper, cyanide, bis(2-ethylhexyl)phthalate, bromodichloromethane, chloroform, and chlorpyrifos as having the largest impacts on the receiving water.[547] The range of assimilative

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[543] Table F-18 identifies no percentage of assimilative capacity used for BOD, and indicates that mean effluent concentration for TSS is less than mean ambient concentrations upstream.

[544] Permit, p. F-98, Table F-18.

[545] Permit, pp. F-98 to F-99, Table F-18; District's October 2010 Comments and Evidence Letter, pp. 61-62.

[546] Permit, p. F-98, Table F-18.

[547] Permit, p. F-94.

capacity for each of the constituents identified varies from 0.6% for chloroform to 44.4% for chlorpyrifos.[548] Thus, the Permit employs an *ad hoc* threshold of *one half of one percent* (0.5%) use of available assimilative capacity in the Sacramento River downstream of the District's discharge as a benchmark to determine that a particular pollutant in the discharge is degrading downstream receiving water quality. A significance threshold of 0.5% is exceptionally low, and is, in fact, not likely measurable in ambient waters.

The use of a 0.5% significance threshold for an existing discharge is not consistent with U.S. EPA guidance or with previous determinations made by the Regional Board. In adopting a permit for Yuba City, the Regional Board relied on APU 90-004 to conclude that a complete antidegradation analysis was not required for the discharges (even though a complete antidegradation analysis was performed by the discharger).[549] The Regional Board also determined that such a finding was consistent with U.S. EPA guidance.[550]

In other permitting actions, the Regional Board incorporated and accepted the ten percent threshold as a measure of significance for determining "substantial lowerings of water quality that should receive a full Tier 2 antidegradation review."[551] In the 2007 permit for the El Dorado Hills wastewater treatment plant, constituents that were considered to significantly increase concentration or mass downstream (i.e., >10% use of assimilative capacity) were subject to an alternatives analysis to determine if the proposed action would be in the best socioeconomic interest of the people of the region, and to the maximum benefit to the people of the state.[552]

The Regional Board has not articulated a technical basis, or legal authority, for establishing a new significance threshold applicable solely to the District's discharge, let alone the District's already-permitted discharge.

[548] Permit, pp. F-98 to F-99.

[549] Order No. R5-2007-0134-01, *supra*, p. F-72.

[550] Order No. R5-2007-0134-01, *supra*, p. F-72.

[551] Order No. R5-2007-0069, *supra*, p. F-57.

[552] Order No. R5-2007-0069, *supra*, pp. F-57 to F-58.

Finally in this regard, Table F-18 undercuts other portions of the Permit. If, for example, ammonia discharges utilize 2.3-10.3% of the assimilative capacity as shown in the Table, that necessarily means that there is assimilative capacity remaining after the discharge. Thus, there is no basis to conclude that any applicable narrative or numeric water quality standard for ammonia is exceeded in the receiving water as a result of SRCSD's discharge.

D. The Determination of Best Practicable Treatment or Control (BPTC) Is Unsupported by Facts and Contrary to Law and Policy

1. BPTC Is Not Treatment for Treatment's Sake

Assuming the antidegradation policies apply, there are additional reasons they were misapplied here. As noted above, State Board Resolution No. 68-16 applies to waters of the state where the existing quality of water is better than necessary to support existing beneficial uses, and sets forth the circumstances under which change to existing high quality waters will be allowed.[553] The determination as to whether a water body is "high-quality" is pollutant specific.[554] If a water is high-quality for a specified pollutant, any activity which "produces or may produce waste, or increased volume or concentration of waste", will be required to comply with waste discharge requirements that result in BPTC of the discharge.[555] BPTC is the level of treatment necessary to assure that pollution or nuisance will not occur, and that the highest water quality consistent with maximum benefit to people of the state will be maintained.[556]

State Board Resolution No. 68-16 incorporates the federal antidegradation policy.[557] The antidegradation policies do not prohibit changes in water quality.[558] Instead, to the extent that the Regional Board relied on determinations of available assimilative capacity to contend that an

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[553] State Board Order No. WQ 86-8, *supra*, p. 28.

[554] APU 90-004, p. 4.

[555] State Board Resolution No. 68-16.

[556] State Board Resolution No. 68-16. It is worth noting that BPTC is not a basis for establishing WQBELs, which must be developed under applicable federal and state law. The Regional Board is not entitled to leap from a finding of degradation to defining BPTC and then back-calculate the effluent limits.

[556] State Board Resolution No. 68-16.

[557] See State Board Order No. WQ 86-17, *supra*, pp. 17-18.

[558] Attwater Memo re: Federal Antidegradation Policy, p. 10.

antidegradation analysis was warranted, the federal approach to Tier 2 protection would apply.[559] Tier 2 employs a public interest balancing test that weighs impacts on water quality against the need for economic or social development. The greater the impact on water quality, the more robust and compelling the justification must be regarding the need to accommodate economic or social development.[560] As discussed below and elsewhere in this memorandum, the impact to water quality of maintaining the existing permitted discharge is negligible. However, the socioeconomic impact of requiring over $2 billion in new treatment is significant. Thus, the treatment required to comply with the Permit is not "to the maximum benefit" to the region or the State as a whole.

The determination of BPTC must follow an in-depth analysis. What constitutes BPTC for a particular discharge depends on the circumstances of that discharge and several additional factors. A determination of BPTC is guided by the reasonableness standard.[561] "One factor to be considered in determining best practicable treatment or control would be the water quality achieved by other similarly situated dischargers and the methods used to achieve that water quality. Information concerning alternatives and costs of alternatives is relevant to determining compliance with Resolution 68-16."[562] "While the Regional Water Board may not specify the manner of compliance with waste discharge requirements, however, it must consider 'best practicable treatment or control' of the discharge. The Regional Water Board should require the [discharger] to consider additional methods that will control the discharge, including methods

[559] The federal policy sets forth three tiers for protection: Tier 1, which requires protection of existing instream water uses and is intended to serve as a baseline to ensure that existing uses be maintained; Tier 2, which requires that where water quality exceeds levels necessary to support beneficial uses (i.e., is better than necessary), water quality shall be maintained and protected unless allowing lower water quality is necessary to accommodate important economic or social development in the area where the waters are located; and, Tier 3, which applies to outstanding national resource waters (ONRW). (40 C.F.R. § 131.12(a).) Although the Delta is an important water body, it is not a designated ONRW and therefore Tier 3 does not apply.

[560] Attwater Memo re: Federal Antidegradation Policy, p. 12.

[561] State Board Order No. WQ 86-8, *supra*, p. 29.

[562] *In the Matter of the Petition of San Luis Obispo Golf and Country Club*, State Board Order WQ 2000-07 (April 26, 2000), pp. 10-11.

used by other similarly situated dischargers, in determining the appropriate effluent limitations."[563]

The law does not require "treatment for treatment's sake."[564] Practicability is more than a matter of engineering feasibility or whether something *can* be done. The question is whether, on balance, the water quality benefit to be achieved warrants the costs of the application of the technology, including increased energy demands and other impacts.

Here, the Regional Board concluded that BPTC for the District's discharge includes implementation of nitrification, denitrification, and the equivalent of Title 22 tertiary filtration with ultraviolet light or chlorine disinfection treatment.[565] The Permit includes statements regarding conditions in the Delta and restates the conclusion that the Permit requires BPTC. Nowhere in the Permit does the Regional Board cite the evidence supporting this conclusory finding nor set forth a meaningful analysis as to why, based on the evidence, these particular requirements and not others constitute BPTC. There is no meaningful effort to determine whether these requirements are reasonable, or, whether they are necessary to assure that pollution or nuisance will not occur. Further, there is no evidence to establish the existence of a benefit of consequence.[566]

Before delineating BPTC, the Regional Board must first conduct a complete antidegradation analysis considering both Resolution No. 68-16 and the federal antidegradation policy. APU 90-004 provides guidance regarding when an antidegradation analysis is required,

[563] State Board Order No. WQ 2000-07, *supra*, p. 12. While BPTC is not expressly defined, guidance can be found in the CWA provisions related to development of effluent limitations requiring application of "the best practicable control technology currently available as defined by the Administrator." (33 U.S.C. § 1311(b)(1)(A).) "Best practicable control technology currently available" is determined based on several factors, including, "the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and other factors as the Administrator deems appropriate." (33 U.S.C. § 1314(b)(1)(B).) An analysis of these factors may assist in determining BPTC for a particular case.

[564] Senate Comm. on Environment and Public Works, 95th Cong., 2d Sess., Legislative History of the Clean Water Act of 1977, at 343 (Comm. Print 1978); see also *Natural Resources Defense Council v. U.S. EPA*, 656 F.2d 768, 773 (D.C. Cir. 1981) (in enacting the CWA, Congress expressed a desire to avoid "treatment for treatment's sake").

[565] Permit, pp. F-96, J-12.

[566] See sections V-VII, *supra*, concerning filtration, nitrification, denitrification.

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what the analysis entails, and how the review should be completed. The following steps are required:

1. Compare receiving water quality to the water quality objectives established to protect designated beneficial uses.

2. Balancing the proposed action against the public interest.

3. Report on the antidegradation analysis.

Unlike other recent permits issued by the Regional Board, the Permit does not include or reference an appropriate complete antidegradation analysis to support its BPTC conclusions.[567] Initially, it deserves emphasis that the entire "analysis" consists of a paragraph on the bottom of page F-96, various bullet points, a Table F-18 which is of almost no value (as discussed below), and two argumentative paragraphs added after the public comment period. This is far, far from the rigor that is necessary to support such dramatic outcomes.

The Permit includes at best a beginning of the analysis required under Step One of the guidance. Table F-18 does include a comparison of some effluent data and downstream receiving water quality below the District's discharge to the applicable water quality objectives.[568] Importantly, however, it *does not perform step 1 at all* for nitrate, total coliform, or other filtration-related requirements. Moreover, the Regional Board, as discussed above, employed an entirely novel way of viewing that information rather than applying thresholds of significance consistent with recent antidegradation reviews for other dischargers. The Regional Board then left the task unfinished, omitting the second and third steps. The Regional Board did not undertake the balancing of the proposed action against the public interest as required in Step Two. Nor did the Regional Board set forth the required report, which is to include specific components and is designed to provide the transparency necessary to "ensure full intergovernmental

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[567] The Regional Board could not rely on the District's 2009 Expansion ADA for an analysis of the socioeconomic impacts of the Permit. The 2009 report evaluated only the impacts of advanced treatment of the SWRTP effluent to remove the increment of mass loading that would result from a proposed increase in discharge capacity from 181 mgd to 218 mgd. The District's Expansion ADA did not evaluate the socioeconomic impacts of full nitrification, full denitrification, and the equivalent of Title 22 filtration with ultraviolet light or chlorine disinfection for the existing discharge.

[568] Permit, pp. F-98 to F-99.

coordination and public participation in the permitting process."[569] All three steps are necessary to ensure compliance with the state and federal antidegradation policies (i.e., is the action to the maximum benefit of the public, and necessary to accommodate important economic or social development in the area?). Had such an analysis been properly performed, the conclusions in the Permit with respect to BPTC would be entirely different. The Regional Board's analysis is fundamentally deficient, and would not have been accepted had it been submitted by a regulated entity.

2. Bullet Points Are Not Analysis

In support of the assertion that the identified levels of treatment constitute BPTC, the Permit sets forth a series of bulleted summary statements.[570] These bullet points are statements of fact of varying relevance which, even if true, do not support the Regional Board's conclusions and "soundbite" argumentative conclusions. These purported "findings" fail to satisfy the rigor specified in APU 90-004, which states that the antidegradation analysis should be summarized in the fact sheet and include all of the following: water quality parameters and beneficial uses which will be affected by the proposed action and the extent of the impact; scientific rationale for determining the proposed action will or will not lower water quality; description of the alternative measures that were considered; a description of socioeconomic evaluation; and the rationale for determining that the proposed action is or is not justified by socioeconomic considerations.[571]

The first four statements in the list of bullet points are statements of fact.[572] The District does not dispute the importance of the Sacramento River and the Sacramento-San Joaquin Delta, or the fact that the Delta is an important environmental and economic resource for the state. These four statements do not provide any evidence to suggest that the District's existing discharge is negatively affecting these beneficial uses, or that the proposed treatment

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[569] APU 90-004, p. 6.

[570] Permit, pp. F-94 to F-96.

[571] APU 90-004, p. 6.

[572] See Permit, pp. F-94 to F-95.

requirements in the Permit are reasonable. These are merely statements of fact, and are a far cry from the analysis required by law.

The bullet statement that "[a]mmonia, along with BOD, from the SRWTP reduces the dissolved oxygen in the Sacramento River and Sacramento-San Joaquin Delta for nearly 40 miles below its discharge" does not lead to the conclusion that full nitrification is necessary to ensure compliance with dissolved oxygen water quality objectives.[573] To the extent that discharges from the SRWTP reduce dissolved oxygen in certain areas downstream of the SRWTP discharge, the Regional Board could have imposed an appropriate limit on oxygen demand that would ensure future compliance with dissolved oxygen water quality objectives under all projected critical river flow and temperature conditions. To comply with such a limit, the District would have to decrease the levels of ammonia and/or BOD in its discharge. However, full nitrification of effluent from SRWTP is not necessary to meet water quality objectives for dissolved oxygen.[574]

The bullet statement that "[t]he oxygen depleting constituents from the SRWTP use or will use all the assimilative capacity of the River and Delta leaving no assimilative capacity available to other communities that currently reduce oxygen demanding constituents by implementing advanced treatment processes," is simply not relevant to the Permit and is highly misleading.[575] The District is not requesting or proposing an increase in discharge, and therefore it does not seek to use additional assimilative capacity beyond what has been permitted previously. The District agrees that a limit on oxygen demand from the SRWTP is appropriate to ensure applicable dissolved oxygen water quality objectives are met. A permit that did not require full nitrification would not consume assimilative capacity otherwise available. With regard to those facilities that discharge effluent to receiving waters either within or tributary to the Delta downstream of Rio Vista (i.e., Stockton, Galt, Tracy, Manteca, Lodi, El Dorado Hills, and

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[573] Permit, p. F-95.

[574] District's Low Dissolved Oxygen Prevention Assessment (LDOPA 2010); see section VI, *ante*.

[575] Permit, p. F-95. The issue of assimilative capacity is also discussed in Attachment J of the Permit. The Regional Board's assertions with regard to how other dischargers would be affected by the lack of assimilative capacity for oxygen demanding constituents was refuted in the District's comments. (District's October 2010 Comments and Evidence Letter, pp. 42-43.)

Ironhouse), the District's far field modeling shows that SRWTP effluent comprises 0.82 - 3.53% (99.91 percentile at a discharge rate of181 mgd) of any given volume of water at various locations in the Delta. It is inconceivable that a hypothetical 2% of SRWTP effluent in a volume of water at some location in the Delta would exert such a demand on dissolved oxygen that there would be no assimilative capacity in the receiving water for additional oxygen demanding substances contributed by another discharger.[576] Further, other municipalities have not previously been regulated based on dissolved oxygen in the Sacramento River downstream of the SRWTP and it is highly unlikely that would occur, in part because their oxygen demand is asserted upstream.

With regard to ammonia, the Permit bullets assert: "The ammonia from the SRWTP contributes to the water quality problems in the Suisun Bay"; "The ammonia from the SRWTP is acutely and chronically toxic to species, including copepods and freshwater mussels that reside in the Sacramento River and Sacramento-San Joaquin Delta"[577]; and, "Ammonia in the SRWTP effluent combined with chlorine disinfection creates nitrosamines at levels 100 times greater than the primary MCL. Nitrosamines are highly mutagenic and potentially carcinogenic."[578] Even if all of these statements were unambiguously true, the Regional Board has the authority—and the obligation—to adopt WQBELs to implement applicable numeric or narrative water quality objectives to address each of these issues. But single-minded advocacy for *pre-ordained treatment outcomes* is not appropriate. In the meantime, of course, the conclusions are overly simplistic, misleading, and incorrect. The District addresses these ammonia-related issues in detail in section VI above.

The Permit bullets also include a statement regarding risk of pathogenic illness that allegedly occurs "at times."[579] The precise basis for the statement is uncertain, but the issue of pathogens and health risks *is fully* addressed in section V above. The discharge causes no

[576] District's October 2010 Comments and Evidence Letter, p. 43.

[577] In the September Tentative Permit, these alleged toxic effects were characterized as possible ("ammonia from the SRWTP may be acutely or chronically toxic"). The sentence was revised to an affirmative statement that the effluent is toxic without any corresponding reference to new data or information that led to a different conclusion. (November Redline Tentative Permit, p. F-94.)

[578] Permit, p. F-95.

[579] Permit, p. F-95.

meaningful increase in risk and recreational users are clearly protected at the current level of disinfection. The Permit bullets also state that filtration will reduce levels of certain pollutants.[580] While this may be factually correct to some degree with regard to some of the pollutants listed, the statement is beside the point. Filtration was not proposed based on incidental removals of constituents such as copper, but on alleged protection of the recreation use. Nor has any antidegradation analysis at all been provided for the other constituents such as BOD or TSS. Thus, this bullet point provides no support for establishing filtration as BPTC.

The bullet points also include the sweeping statement that "[r]eduction or elimination of ammonia, nitrate and protozoans will reduce impacts to the beneficial uses of the Sacramento River and Sacramento-San Joaquin Delta from the SRWTP discharge." The Permit provides no evidence that, in fact, advanced treatment of the SRWTP discharge provides tangible or definite benefits or otherwise leads to improved attainment of beneficial uses. As discussed in section V above, the facts indicate that there is no discernible benefit in the highly costly filtration requirements, and they are not reasonable. With regard to a determination of BPTC, in consideration of the dilution provided in the receiving water, the *de minimis* nature of risk posed by the current discharge, and the costs (economic, environmental, and otherwise), the current level of treatment at the SRWTP provides BPTC.

The last two bullets in the Permit are apparently designed to bolster the conclusion that the treatment requirements proposed are the same as those of other similarly situated dischargers.[581] As discussed below, the information presented does not represent a comparison to "other similarly situated dischargers," and therefore the statements are without support.

The Regional Board concluded that an antidegradation analysis was required for the District's existing discharge due to changes in downstream conditions.[582] Even assuming the analysis was required, the Regional Board had an obligation to conduct the analysis required

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[580] Permit, p. F-95.

[581] Permit, p. F-96; see State Board Order WQ 2000-07, *supra*, pp. 10-11 ("One factor to be considered in determining best practicable treatment or control would be the water quality achieved by other similarly situated dischargers and the methods used to achieve that water quality.").

[582] Permit, p. F-93.

under state and federal policy and guidance. The page of bullet points set forth as findings falls far short of the requirement that the Regional Board articulate "[t]he scientific *rationale* for determining that the proposed action will or will not lower water quality" and the "*rationale* for determining that the proposed action is or is not justified by socioeconomic considerations."[583]

3. The Regional Board Did Not Conduct the Required Balancing of Socioeconomic Impacts and Water Quality Benefits

When determining if an increased load of a pollutant to a high quality water should be allowed, the Regional Board must determine if the discharge is necessary to accommodate social or economic development and is consistent with maximum public benefit.[584] In making such a determination, State Board guidance specifies several factors to be considered, including "[e]conomic and social costs, tangible and intangible, of the proposed discharge compared to benefits."[585] The economic impacts to be considered include those affecting such parameters as housing, employment, and income.[586] These impacts are weighed against the benefits to be obtained by requiring the expenditures.

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[583] APU 90-004, p. 6, emphasis added.

[584] Where the federal antidegradation policy applies, Resolution No. 68-16 incorporates the tests from the federal antidegradation policy to determine if changes in water quality are consistent with the maximum benefit to the people of the state. (State Board Order No. WQ 86-17, *supra*, p. 17.)

[585] APU 90-004, p. 5. The factors are:

a. Past, present, and probable beneficial uses of water.

b. Economic and social costs, tangible and intangible, of the proposed discharge compared to benefits. The economic impacts to be considered are those incurred in order to maintain existing water quality. The financial impact analysis should focus on the ability of the facility to pay for the necessary treatment. The ability to pay depends on the facility's source of funds. In addition to demonstrating a financial impact on the publicly- or privately-owned facility, the analysis must show a significant adverse impact on the community. The long-term and short-term socioeconomic impacts of maintaining existing water quality must be considered. Examples of social and economic parameters that could be affected are employment, housing, community services, income, tax revenues, and land value. To accurately assess the impact of the proposed project, the projected baseline socioeconomic profile of the affected community without the project should be compared to the projected profile with the project.

c. The environmental aspects of the proposed discharge must be evaluated. The proposed discharge—while actually causing reduction in water quality in the given water body—may be simultaneously causing an increase in water quality in a more sensitive body of water from which the discharge in question is being diverted; e.g., changing the location of San Francisco's outfall from the Bay to the ocean.

d. The implementation of feasible alternative control measures which might reduce, eliminate, or compensate for negative impacts of the proposed action. (APU 90-004, p. 5.)

[586] APU 90-004, p. 5.

Here, no increased load of pollutants was permitted. To the extent that the Regional Board nonetheless judged an antidegradation analysis to be proper, the Regional Board must determine whether the cost (and impacts to the region) of full nitrification, full denitrification, and equivalent of Title 22 filtration are outweighed by the benefits to be realized and thus constitute BPTC for the discharge. Specifically, the Regional Board must find that the proposed requirements do not unduly impact social and economic development and are to the maximum benefit to the people of the state.

a. The Regional Board's Consideration of Socioeconomic Impacts Was Superficial and Deficient

In conducting an antidegradation review, the Regional Board is to consider "[e]conomic and social costs, tangible and intangible, of the proposed discharge compared to benefits."[587] The State Board has provided guidance, in other contexts, as to what is required to meaningfully consider economics.[588] A regional board should review currently available information and "consider, and respond on the record, to any information provided by dischargers or other interested persons regarding the potential cost implications . . . ."[589] The information necessary to conduct the requisite comparison of costs and benefits for antidegradation review was available to the Regional Board at the time the Permit was adopted. A technical memorandum, *Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant* (Cost/Benefits Analysis), was submitted to the Regional Board in May 2010. This analysis evaluated the cost of implementing five advanced treatment trains and the changes in downstream water quality that these treatment trains could achieve. The report evaluated full nitrification, full denitrification, filtration, and UV disinfection, as well as reverse osmosis, ozone/peroxide oxidation, and combinations of these various treatment processes, and concluded

[587] APU 90-004, p. 5.

[588] Attwater Memorandum, p.5.

[589] Attwater Memorandum, p. 5. While this guidance was focused on the analysis to support water quality objectives, the Regional Board has applied a similar process in analyzing economics related to other decisions, including total maximum daily load development. (See Memorandum from Sheila K. Vassey to Stefan Lorenzato, October 27, 1999.)

that the high costs associated with the implementation of advanced treatment of SRWTP secondary treated effluent discharged at the once proposed rate of 218 mgd are disproportionate to the water quality benefits that may be observed in downstream receiving waters with implementation of advanced treatment.[590] The report found that the change in downstream water quality that would be realized from implementation of advanced treatment at SRWTP was not commensurate with the cost of advanced treatment even at the higher discharge volume.[591] Given the minor, and in some cases immeasurable reductions in downstream receiving water constituent concentrations that would result from the advanced treatment train alternatives, the high capital and total annual costs of implementation of advanced treatment were found to be disproportionate.

In addition, a study prepared by the University of the Pacific (UOP) evaluated the socioeconomic impacts of implementing nutrient removal for a SRWTP discharge rate of 181 mgd, and found that nutrient removal of the SRWTP discharge is estimated to lead to an annual income loss of $94.4 million and an annual employment loss of 390 jobs in the District's service area, which covers most of Sacramento County.[592] While the Permit makes passing reference to studies having been "considered," the Permit does not describe the findings of these studies and state why they are, or are not, relevant or accurate.[593] There was also substantial

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[590] Cost/Benefits Analysis, p. 5-2. As noted, the District withdrew its request to increase the SRWTP capacity from 181 mgd to 218 mgd. The increment of pollution reduction due to implementation of advanced treatment of a 181 mgd discharge would be even smaller than the increment in pollution reduction modeled for a 218 mgd discharge.

[591] Cost/Benefits Analysis, p. XII.

[592] Michael, Dr. Jeffrey, Pogue, Dr. Thomas, Business Forecasting Data, Eberhardt School of Business UOP, Advanced Wastewater Treatment for Nutrient Reduction: Impact on Sacramento Income and Employment (Aug. 23, 2010) (UOP Study), p. 8. The UOP Study that is in the record (see Hearing Transcript p. 253:7-16 [second UOP Study was released after public comment period]) is limited to the impacts of nutrient removal, which is considered to consist of NTF, FBR, and two new pumping stations for a flow rate of 181 mgd. The UOP Study does not include an assessment of impacts associated with costs for Title 22 or equivalent filtration with ultraviolet light or chlorine disinfection treatment. The Staff Report seizes on UOP's estimate of the loss of jobs from curtailment of water experts and closure of the salmon fishery in 2008 and 2009 as somehow relevant "if the District were to receive a permit that provided less stringent requirements." (Staff Report, p. 39.) These job losses are not attributed to SRCSD's discharge, and therefore do not support the staff's premise. The Regional Board made no attempt to establish, let alone estimate, a relative alleged contribution of SRCSD's discharge to the overall decline of the fisheries.

[593] Various other parties, and the Regional Board's own consultants also identified significant costs associated with nitrification, denitrification, and filtration. The Permit does not disclose which of these estimates the Regional Board

testimony by others of the significant economic impacts to the region. The North State Building Industry Association submitted a report detailing the drastic impact of the increased connection fees on development in the region.[594] Campbell's Soup and other area businesses provided compelling testimony regarding the effects of increased sewer rates on their ability to remain in business, and residents addressed the personal hardship that the unprecedented rate increases would have on their families.[595]

The Permit does not make any specific findings about the expected cost of compliance. The Regional Board did not refute the District's analyses, nor identify countervailing considerations, but simply concluded that even a $2 billion cost is reasonable because: (1) other dischargers have incurred significant costs; and (2) "failure to implement tertiary filtration, nitrification, and denitrification *may result or will likely result* in an adverse impact to the REC-1, municipal and domestic water supply, aquatic life, and agricultural beneficial uses."[596] These possible adverse impacts are purely speculative, and are not supported in the Permit. Clearly, the Regional Board was not to be deterred from its course of requiring particular treatment without regard to either the magnitude of the costs or theoretical nature of the presumed benefits.

b. The Cost Information Related to Other Dischargers Is Biased, Suspect, and Misleading

The sum of the Regional Board's inquiry into the reasonableness of the costs of implementing the Permit is set forth in Table F-17 of the Permit, which is titled "Per Capita Costs of Tertiary Upgrades." The information in Table F-17 is presented without reference to its source

relied upon or why it considered one evaluation to be more relevant than another. (See Memorandum dated August 13, 2010, to Kathleen Harder, Regional Board, from PG Environmental, LLC, Subject: Technical Review of Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant; Memorandum dated August 18, 2010, to Kathleen Harder, Regional Board, from PG Environmental, LLC, Subject: Technical Review of Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant; Technical Memorandum, Trussell Technologies, Ammonia Removal Cost Alternatives for the Sacramento Regional Wastewater Treatment Plant (May 31, 2010); Trussell October 1 Letter; see section IV above regarding Cost Considerations.)

[594] Economic Planning Systems, Inc., Sacramento County Regional Sanitation District Potential Fee Increase Analysis (October 8, 2010); Hearing Transcript, pp. 333:7-335:8.

[595] See, e.g., Hearing Transcript, pp. 1:25, 342:20-344:4; see also the numerous comment letters from residents of the region in the record.

[596] Permit, p. F-97, emphasis added.

or citation to evidence in the record. First, the Permit states in a footnote that the Table is based on a "telephone survey."[597] There *was no* formal survey conducted. Rather, Regional Board staff selected and called certain specific municipal dischargers for information.[598] Regional Board staff did not speak to representatives of each of the entities listed, and in some instances staff provided the information in Table F-17 for a discharger without even having spoken to anyone affiliated with the discharger at all. There is no indication, anywhere, of what questions were asked, what the specific answers were, why these individual entities were chosen for "surveying," or why they might be "similarly situated" to the District. Further, assuming that the goal of the so-called "survey" was in some way to gather information regarding the costs of compliance with post-secondary treatment, an objective survey that included a truly representative sample would have revealed the answer to be *zero* for many municipal dischargers who are permitted to discharge secondary effluent. The purported survey identifies a "per capita" cost that is not based on appropriate information, such as costs that have actually been incurred, financing methods, allocation among existing, new, and industrial users, or other factors that would affect the actual costs to residents, or the actual impacts in the specific community under consideration.

Still further, a notable change occurred in Table F-17 after the September Tentative Permit. The title of Table F-17 (which was formerly F-18 in the September Tentative Permit) is "Per Capita Costs for Tertiary Upgrades." But the heading *within* Table F-17 itself was *changed,* from "Tertiary Conversion Cost" to "Upgrade and Expansion Costs."[599] The District submits that "upgrade and expansion" means something quite different than "tertiary conversion." For example, the District's estimated costs do not include expansion.

[597] Permit, p. F-96.

[598] The September Tentative Permit contained a version of the same table. (September Tentative Permit, p. F-93.) Subsequent to the issuance of the September Tentative Permit, District representatives visited the Regional Board on September 21, 2010, to, among other things, acquire the survey or information regarding the survey. As of September 21, 2010, the only information available in any way related to the survey was an electronic mail response from Larry Parlin with the City of Stockton and an Excel file that replicated Table F-17. (District's October 2010 Comments and Evidence Letter, p. 74.) Subsequently, Regional Board staff, other than the person identified as the surveyor, prepared a memorandum for the file dated September 29, 2010, nearly four weeks after release of the September Tentative Permit. The memorandum to file merely states that a telephone survey was conducted in July of 2010. It does not include or identify the questions asked to the various contacts from the other POTWs, or document the responses given. (Memorandum to File dated September 29, 2010, from Kathleen Cole Harder, Regional Board.)

[599] See November Redline Tentative Permit, p. F-96; Permit, p. F-96.

Several of the entities represented in Table F-17 disagreed with the inclusion of the information in the Permit in written comments that are part of the Permit record.[600] The City of Roseville's representative, Art O'Brien, stated that the information in Table F-17 did not accurately reflect his conversation with Regional Board staff and that it was not possible to isolate tertiary treatment costs from other improvements.[601] He also made clear that tertiary treatment was required as a result of a master plan EIR and, at Roseville's Deer Creek plant, the upgrade was associated with an expansion in discharge volume.[602] Mr. O'Brien requested that Table F-17 be deleted or, at a minimum, the references to the City of Roseville be removed.

Similarly, the City of Vacaville noted that the $150 million in costs identified for Vacaville includes all plant upgrades, such as construction of storage to eliminate bypass and demolition of outdated facilities.[603] Vacaville's letter also emphasized that far from considering these costs to be reasonable, Vacaville views them as an extraordinary expenditure for improvements that will yield "minimal Delta water quality benefit."[604] As for Ironhouse Sanitary District (ISD), which was issued a permit for a new discharge to the Delta, their letter makes clear that:

> In ISD's case, the $54.5 million is the total cost of constructing an entirely new treatment facility along with major influent and effluent piping and new river outfall to meet all permit requirements for a new surface water discharge—not an incremental cost for upgrading an existing secondary treatment facility to tertiary. There is concern that listing this cost figure in a column headed "tertiary conversion costs" is misleading and may result in "apples to oranges" comparisons.[605]

It is clear that even the selective, perfunctory analysis conducted by the Regional Board is unreliable and cannot be deemed to constitute a socioeconomic analysis as required under the

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[600] Though four entities requested that Table F-17 be deleted, or at a minimum, the information relating to their facilities be deleted, only the City of Davis was removed from Table F-17 in the final Permit. (November Redline Tentative Permit, p. F-96.)

[601] Letter dated September 22, 2010, to Kathy Harder, Regional Board, from Art O'Brien, City of Roseville.

[602] Letter dated September 22, 2010, to Kathy Harder, Regional Board, from Art O'Brien, City of Roseville.

[603] Letter dated October 8, 2010, to Kathleen Harder, Regional Board, from David K. Tompkins, City of Vacaville.

[604] Letter dated October 8, 2010, to Kathleen Harder, Regional Board, from David K. Tompkins, City of Vacaville.

[605] Letter dated October 5, 2010, to Kathleen Harder, Regional Board, from Jennifer Skrel, Ironhouse Sanitary District.

antidegradation policies.[606] Thus, the Regional Board should not have relied on this information to determine BPTC for the District's discharge.

c. The District's Situation Is Not Similar to Other Dischargers Cited in the Permit

Among the factors to be considered in determining BPTC for a particular discharge are "methods used by other similarly situated dischargers."[607] As noted above, the socioeconomic component of Regional Board's BPTC analysis consists of merely a table comparing the per capita costs of implementing the Regional Board's desired treatment train to those of other allegedly similarly situated communities.[608] Following the table, the Permit states that economic and socioeconomic studies provided by the District and other parties were considered and concludes that even if the cost to implement the Permit is $2 billion, the resulting monthly sewer service charge of $60 is reasonable because:

> (1) many communities discharging to surface waters pay substantially more for sewer service; and (2) the increased sewage treatment rate of $60 per month may be overestimated given that other large communities in the Sacramento/ Delta area that [sic] have already upgraded their treatment facilities to advanced treatment also similar to that proposed in these waste discharge requirements have sewer fees substantially less than the monthly fees projected by the Sacramento Regional County Sanitation District, including the Cities of Stockton, Roseville, Tracy, and Lodi.[609]

This "analysis" is not only overly simplistic, but fatally flawed on multiple levels. First of all, these dischargers are not all similarly situated to the District. The District's "situation" is as follows: it discharges treated effluent from a multiport diffuser lying on the bottom of the largest river in California. The Sacramento River flow provides very considerable dilution of the effluent in the immediate receiving water. In such situations, the Regional Board has not required filtration, as described in section V. In addition, the Regional Board typically grants mixing

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[606] The superficiality of these comparisons was demonstrated by District Engineer Stan Dean during his hearing testimony. (Hearing Transcript, pp. 224:4-225:7; see also section IV of this Statement of Points and Authorities.)

[607] State Board Order No. WQ 2000-07, *supra*, p. 12.

[608] Permit, p. F-96.

[609] Permit, p. F-97.

zones.[610] None of the named entities discharges directly to the Sacramento River. The cities of Manteca and Stockton discharge to the San Joaquin River, which has very different ambient water quality, flows, and other characteristics.[611] Most of the examples provided are POTWs that discharge to effluent dominated waterways (small creeks and sloughs) where dilution does not occur during critical low flow periods (e.g., Roseville, Lodi, Woodland, and Vacaville).[612] Absent the end-of-pipe effluent limitations, which drive the high treatment costs, these entities would have been considered to use more than 100% of the assimilative capacity of their immediate receiving waters for various relevant pollutants, a situation vastly different than that of the District.[613] ISD discharges seasonally to the San Joaquin River in the western Delta, and applies recycled water in the summer months to adjacent agricultural lands.[614] For its discharge to the San Joaquin River, ISD is considered a "new discharger."[615] It elected to propose treatment beyond secondary treatment for its "new" discharge to the Delta, approved in 2008.[616]

In comparison, the cities of Yuba City, Corning, and Chico all discharge to mainstem rivers tributary to the Delta where significant dilution is available.[617] For these cities, the Regional Board has adopted effluent limits that are consistent with secondary treatment standards and do not require implementation of filtration, nitrification, or denitrification.[618] Further, the Regional Board has found that compliance with these secondary treatment requirements will result in "the use of best practicable treatment or control of the discharge."[619] Given the concerns

[610] See sections VI and VII, *supra*, IX, *post*; and District's October 2010 Comments and Evidence Letter, pp. 78-88.

[611] See District's October 2010 Comments and Evidence Letter, p. 74.

[612] See District's October 2010 Comments and Evidence Letter, p. 74.

[613] See District's October 2010 Comments and Evidence Letter, p. 74.

[614] See District's October 2010 Comments and Evidence Letter, p. 75.

[615] See District's October 2010 Comments and Evidence Letter, p. 75.

[616] See District's October 2010 Comments and Evidence Letter, p. 75.

[617] See District's October 2010 Comments and Evidence Letter, p. 75.

[618] See Order No. R5-2010-0080 (City of Corning), p. 11; see also Order No. R5-2010-0019 (City of Chico), p. 11; see also Order No. R5-2007-0134-01, *supra* (Yuba City), p. 11.

[619] Order No. R5-2010-0019, p. F-39; Order No. R5-2007-0134-01, p. F-78; see also Order No. R5-2010-0080, pp. 8-9 (where the Regional Board finds that the discharge is consistent with Resolution No. 68-16 and the federal antidegradation policy). While Order No. R5-2010-0080 includes a reference to further discussion in the Fact Sheet, this discussion is absent from the adopted permit.

expressed in the Permit for ecosystem effects in Suisun Bay and recreational impacts in the near field, deep water dischargers to San Francisco Bay (including Central Contra Costa Sanitary District, Delta Diablo Sanitation District, East Bay Dischargers Authority, East Bay Municipal Utility District, and the City and County of San Francisco) *are* similarly situated to the SRWTP. These large municipal facilities are all permitted by the San Francisco Bay Regional Water Quality Control Board to discharge secondary effluent to the Bay or Delta *without nitrification*.[620]

A theme of the Permit and related documents is that other "large" dischargers in the "Delta" have been required to implement advanced treatment, so the District should too.[621] This is overwhelmingly simplistic and misleading. Other dischargers in the Delta have been issued WQBELs based on the effects of the discharge on immediate receiving waters and consideration of applicable policies. This practice is applicable throughout the Central Valley region and should apply to the District.

Moreover, the Regional Board is by its own admission regulating the District differently from the communities it has identified as comparable. In the District's Permit, the Regional Board applied a different approach to antidegradation, the granting (or denial) of dilution credits, and the application of water quality standards for ammonia, nitrate, and pathogens.

The "Delta" as referenced by the Regional Board is presumably the triangle drawn by the legislature in Water Code section 12220. It is as arbitrary to base effluent limitations on location within this triangle as it would be to have limitations based on the boundaries of San Joaquin County (which also encompass Lodi, Stockton, Manteca, and Tracy). Indeed, very little of the District is in the Delta and SRCSD could theoretically move its diffuser somewhat, such that the diffuser would not be located in "the Delta." If this occurred, should this affect the requirements properly imposed on the District? Obviously not. Nor should the District's location at the top of the "Delta" triangle serve to justify requirements not otherwise justified.

[620] Order No. R2-2007-008 (Central Contra Costa Sanitary District); Order No. R2-2009-0018 (Delta Diablo Sanitation District); Order No R2-2006-0053 (East Bay Dischargers Authority); Order No. R2-2010-0060 (East Bay Municipal Utilities District, Special Dist. No. 1); Order No. R2-2008-0007 (City and County of San Francisco).

[621] Permit, p. F-97; Staff Response to Comments, p. 44.

As discussed previously, the Regional Board required filtration for Lodi, Stockton, Manteca, and Tracy as a result of application of the 20:1 policy, finding insufficient dilution.[622] Similarly, these municipalities' WQBELs requiring nitrification and denitrification (other than Stockton, which has no denitrification requirement) are driven by the conditions of discharge to the immediate receiving water. Consistent application of these policies and reasoning to this Permit would not result in a requirement for advanced treatment.

The Regional Board based the ammonia effluent limitations in the recently issued permits for Manteca, Lodi, Tracy, and Stockton on the U.S. EPA's National Ambient Water Quality Criteria (NAWQC) for the protection of aquatic life when salmonids and early life stages are present.[623] None of these dischargers were subject to effluent limitations based on "recent studies," anticipated but not yet published U.S. EPA criteria revisions, the speculation that their discharges *may have* effects on diatoms, or other hypotheses.[624]

With regard to dilution, the Manteca discharge occurs through a 36-inch diameter pipe located on a side bank, which the Regional Board found provides minimal dilution.[625] The discharge is to a tidally influenced section of the San Joaquin River, which experiences flow reversals and prolonged near-slack water conditions under low flow conditions.[626] In addition, the modeling and field studies for acute and chronic aquatic criteria demonstrated that there is limited dilution within the immediate vicinity of the outfall (acute) and 4,100 feet north of the outfall (chronic).[627] In the absence of additional information, the Regional Board determined that it was not appropriate to allow a mixing zone nor grant dilution credits for acute aquatic criteria.[628]

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[622] See section V, *supra*.

[623] Manteca Permit, pp. F-40 to F-42; Lodi Permit, pp. F-23 to F-24; Tracy Permit, pp. F-30 to F-31; Stockton Permit, pp. F-26, F-27.

[624] Permit, pp. J-5 to J-7.

[625] Manteca Permit, p. F-31.

[626] Manteca Permit, p. F-31.

[627] Manteca Permit, pp. F-31 to F-32.

[628] Manteca Permit, pp. F-31 to F-32.

The Lodi Permit denies dilution credits in part because the receiving water is a tidally influenced dead end slough, a quiescent water body with minimal dilution within the vicinity of the discharge.[629] The Lodi Permit denies dilution credits because Lodi did not provide sufficient information for the Regional Board to determine a mixing zone that will not adversely impact beneficial uses.[630] Similarly, Tracy was denied dilution due to insufficient data to provide design flow for evaluating dilution for the acute and chronic aquatic life criteria; the tidal cycle, slack tide, and critical dry years, which can result in no flow being available for dilution; the receiving water being limited in size; multiple dosing of effluent into the receiving water; and the receiving water being identified as a "Toxic Hot Spot" under the Bay Protection and Toxic Hot Spot Cleanup Program.[631] These situations are manifestly different from the District's, in terms of both the physical discharge using a diffuser at the bottom of the river and the receiving water into which the effluent is discharged.

With regard to Stockton, the Regional Board found that tidal action, river flow stagnation, and negative flow rates cause low flow conditions in the receiving waters resulting in little to no dilution and multiple doses of the effluent.[632] Therefore, and due to the impaired condition of the San Joaquin River, presence of endangered species, and uncertainty of the reliability and accuracy of a "Box Model" study of the discharge and receiving water, the Regional Board did not grant dilution credits for the acute and chronic aquatic life criteria.[633] However, where there was dilution for the municipal beneficial use, the Regional Board granted dilution credits for nitrate.

Indeed, Regional Board staff informed the Regional Board that the Permit is a departure from normal permitting practices: "Normally, we are looking at impacts in the immediate vicinity of the discharge. In this case, this permit is addressing ecosystem concerns all the way

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[629] Lodi Permit, p. F-20.

[630] Lodi Permit, p. F-20.

[631] Tracy Permit, pp. 4, F-22 to F-24, F-31.

[632] Stockton Permit, pp. F-18 to F-19.

[633] Stockton Permit, p. F-19.

down from about 50 miles along the entire length of the Sacramento River downstream of the discharge into and including in [sic] Suisun Bay . . . ."[634]

In other words, the Regional Board characterized the District's discharge as similar for purposes of comparing costs but different for purposes of application of regulations and policy, mixing zone determinations, and calculation of effluent limitations. The inescapable conclusion is that the Permit issued by the Regional Board attempts to have it both ways in order to arrive at a pre-determined destination.

d. The Regional Board Did Not Adequately Consider Feasible Alternatives

The Regional Board should have evaluated the "implementation of feasible alternative control measures which might reduce, eliminate, or compensate for negative impacts of the proposed action."[635] In addition to declining to assess the social and economic impacts on the Sacramento region, the Regional Board failed to consider the implementation of feasible alternative control measures that might counteract any alleged negative impacts of the District's discharge. This shortcoming was pointed out in the District's comments on the September Tentative Permit, and in response, the Regional Board added the following to the Fact Sheet:

> Various alternative measures, including those alternatives provided as part of the proposed waste discharge requirements, have been considered. After considering the alternatives, these waste discharge requirements which implement Title 22 (or equivalent) tertiary filtration, nitrification and denitrification will result in the best practicable treatment or control of the discharge necessary to assure that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.[636]

State Board guidance specifies that the Regional Board must include a "description of the alternative measures that were considered."[637] The Regional Board must do more than simply claim that it has "considered" other alternatives. The Regional Board must actually identify the

[634] Hearing Transcript, pp. 70:21-71:4. While SRCSD does not dispute that the Regional Board can consider areas downstream, the point here is that comparison of this Permit to permits of other Delta dischargers is an apples-and-oranges comparison. Further, of course, any WQBELs based on far field conditions must be justified. Here, the WQBELs are not.

[635] APU 90-004, p. 5.

[636] Permit, p. F-96.

[637] APU 90-004, p. 6.

information in the record that was reviewed, and "bridge the analytic gap" linking the evidence to its ultimate conclusion.[638] Neither the Permit nor other supporting documents, such as an Antidegradation Report or even the Response to Comments, set forth the alternatives considered or the analysis. Therefore this statement, standing alone, is not sufficient to discharge the Regional Board's duty to consider alternatives.[639]

Had the Regional Board given due consideration to alternatives, it would have determined that full nitrification is not necessary to protect beneficial uses in the Sacramento River and the Delta. The Regional Board could reasonably find that removal of some additional amount of oxygen demanding material (presumably ammonia and BOD) from the effluent is necessary to ensure future compliance with dissolved oxygen standards and protect beneficial uses.[640] As discussed in section VI, however, full nitrification is another matter.

The Regional Board also failed to properly evaluate the requirement for the equivalent of Title 22 filtration. Although filtration is an available technology, its application to the District's discharge at the SRWTP is neither practicable, reasonable or necessary. As discussed in section V, the Sacramento River upstream of the SRWTP discharge does not meet Title 22 tertiary standards. Treating SRWTP effluent to Title 22 tertiary standards will not bring the Sacramento River downstream of the SRWTP discharge into compliance with Title 22 tertiary standards. In fact, because the focus is on evaluating the effect of a proposed action on "high quality" water, if 2.2 MPN/100 ml is the benchmark (Title 22 tertiary equivalent), the receiving water is not "high quality" and Resolution No. 68-16 does not apply. Further, as previously explained, the benefits to water quality from requiring filtration are *de minimis* and not commensurate with the cost of building and operating these treatment facilities. Nor does the

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[638] *Topanga*, *supra*, 11 Cal.3d, p. 515.

[639] For an example of the level of detail the Regional Board has set forth in permits for other dischargers, see Order No. R5-2009-0099 (City of Galt) which includes over three pages detailing the alternatives analyzed and the reasons the permit approach was selected. (*Id.*, pp. F-54 to F-58.) "Each alternative was assessed for feasibility in implementation and effectiveness in improving water quality" and summarized in the permit. (*Id.*, p. F-55.)

[640] See section VI, *supra*.

Permit include any findings as to why the proposed treatments are necessary to assure that pollution or nuisance will not occur.[641]

The Regional Board did not properly assess the feasibility and effectiveness of alternative control measures in improving water quality as required by State Board guidance. Thus, the conclusion that the Permit implements BPTC cannot be sustained.

E. The Absence of Environmental and Public Health Benefits Renders the Challenged Permit Requirements Unreasonable

The Regional Board cannot rely on Resolution No. 68-16 to support requirements designed to reverse past-permitted changes in water quality. The State Board has made clear "[r]esolution No. 68-16 is not a 'zero-discharge' standard but rather a policy statement that existing quality be maintained when it is *reasonable* to do so."[642] Moreover, even if the state antidegradation policy arguably could be stretched to encompass the District's circumstances, the policy may not be read in isolation and does not absolve the Regional Board of its statutory obligations under Porter-Cologne.

The requirements imposed in the Permit in the name of antidegradation are unreasonable and conflict with the general policies of Porter-Cologne. The State Board has declared "[t]he resolution is consistent with state statutes," including Water Code section 13000.[643] Water Code section 13000 provides that "activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is *reasonable*, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible."[644] To comply with the reasonableness requirements of Porter-Cologne and Resolution No. 68-16, the Regional Board would have to find, based on evidence in the record, that requiring nitrification, denitrification, and the equivalent of Title 22 filtration with ultraviolet light or chlorine disinfection is reasonable. The

[641] "Pollution" means an alteration of water quality to a degree that unreasonably affects beneficial uses, or facilities which serve the beneficial uses. (Wat. Code, § 13050(l).) No evidence supports a finding of pollution or nuisance.

[642] State Board Order No. WQ 86-8, p. 29, emphasis added.

[643] State Board Order No. WQ 86-8, p. 29.

[644] Wat. Code, § 13000, emphasis added.

sparseness of the Regional Board's "analysis" to support a finding of reasonableness is hardly surprising, in light of overwhelming evidence in the record that the requirements for advanced treatment are unwarranted.

The treatment requirements identified as BPTC in the Permit would cost the Sacramento region over $2 billion. This would equate to an approximate 309% increase in monthly residential sewer rates for existing ratepayers, an approximate 464% increase for in-fill development fees, and an approximate 470% increase for new development fees.[645] The socioeconomic impacts of the increased costs for existing and new ratepayers would understandably be significant.[646] In contrast, based on uncontroverted evidence in the record, the environmental benefit is negligible, nonexistent, or at most speculative for nearly every measured parameter in the District's discharge. The District does not dispute that some level of ammonia load reduction will help to ensure that the dissolved oxygen objective in the Delta is met even in exceptionally dry years.[647] The issues pertaining to dissolved oxygen can be resolved through implementation of reductions in oxygen demand as a separate requirement of the Permit. With this single exception, however, the record shows that the District's actual impact to water quality is not significant and does not cause or contribute to an exceedance of any water quality objective in the Sacramento River outside the boundaries of a well-defined, small, and approvable mixing zone.

The Permit attributes—or at least hypothesizes—that additional benefits will accrue as a result of requiring the District to fully nitrify its effluent. As fully detailed elsewhere in this document, these asserted benefits are nonexistent, *de minimis*, and/or speculative, with many asserted benefits based on unproven research hypotheses.[648] Benefits that will accrue from

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[645] The percent increases are based on estimated rates and fees calculated from planning level estimates, as discussed in section IV, above. The specific rates and fees to be paid by District customers would depend on treatment technologies employed to achieve compliance with all new requirements, but the planning level costs are representative.

[646] See section IV, *supra*.

[647] District's October 2010 Comments and Evidence Letter, pp. 40-43; see section VII, *supra*.

[648] See section VI, *supra*.

denitrification are equally uncertain.[649] The Permit fails to explain how requiring the District to meet the MCL at the end-of-pipe in a discharge to the Sacramento River will protect customers of downstream drinking water agencies many miles away. The alleged benefits of the tertiary treatment requirements are not merely speculative—they simply do not exist.[650] The pathogen reductions called for in the Permit are intended to protect downstream water suppliers, agricultural irrigators, and recreational users of the river.[651] As discussed in detail elsewhere, the uncontroverted evidence in the record is that all of these uses are protected with current levels of treatment and disinfection.

The Regional Board also failed to consider the adverse environmental impacts associated with the Permit requirements. Advanced wastewater treatment processes produce environmental impacts in the forms of increased power consumption, associated increases in greenhouse gas emissions, and "cross media impacts." Cross media impacts are the interrelated effects caused by removal of a constituent from one medium and its transfer to one or more other media. Microfiltration results in the transfer of constituents from wastewater into biosolids, air, and/or concentrated waste streams. Depending on regulatory limits, additional treatment of the biosolids, air, and/or concentrated waste streams may be required. While the monetary costs of advanced treatment implementation were estimated, the associated environmental impacts of advanced treatment due to increased power consumption and cross media impacts were not given due consideration by the Regional Board. The operation of each advanced treatment process would increase electricity consumption and thus greenhouse gas emissions above those generated by existing SRWTP secondary treatment processes.[652] While not quantified, these environmental impacts must be considered as costs and consequences associated with advanced treatment.

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[649] See section VI, *supra*.

[650] See section V, *supra*.

[651] Permit, pp. F-72 to F-80.

[652] Costs/Benefits Analysis, pp. X-XII.

F. Conclusion

The Regional Board strained to find a basis for the very costly Permit limitations through an unprecedented and nominal antidegradation analysis for an already-permitted discharge. The Regional Board's analysis did not comply with applicable regulations and State Board guidance, and the Regional Board's result-oriented and superficial findings and conclusions are inadequate and unsupported by evidence. The State Board should determine that the discussion and findings under the heading "Satisfaction of Antidegradation Policy" are improper.

IX. OTHER MIXING ZONES WERE IMPROPERLY DENIED AND AN INAPPROPRIATE CHRONIC TOXICITY TRIGGER WAS ESTABLISHED

In accordance with the SIP, Basin Plan, and TSD,[653] the District provided extensive documentation and evidence to support a proposed 60-foot long acute mixing zone, a 350-foot long chronic mixing zone,[654] and a harmonic mean flow human health mixing zone at the point where complete mixing of the SRWTP effluent and Sacramento River occurs, approximately three miles downstream from the discharge point.[655] However, despite the overwhelming and complete evidence submitted by the District, the Permit denies an acute mixing zone even though it meets the requirements of the SIP, and denies mixing zones and dilution credits for specific compounds such as ammonia, nitrate, chlorpyrifos and diazinon, copper, cyanide, and chronic toxicity. The improper denials of mixing zones for ammonia and nitrate are addressed in sections VI and VII, *supra,* and are not repeated here. The Regional Board's improper actions with respect to the other compounds are identified here. In addition, the District explains the related conclusion that the Permit established an inappropriate chronic toxicity trigger.

As a preliminary matter, the District acknowledges that the Regional Board has some discretion in granting mixing zones and dilution credits. However, that discretion is not unfettered and the Regional Board must explain its denials based on consideration of the facts of

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[653] TSD.

[654] Technical Memorandum, "Mixing Zones and the Prevention of Acutely Toxic Conditions," to Bob Seyfried and Vyomini Pandya SRCSD (July 13, 2009).

[655] SRCSD, "Sacramento River Harmonic Mean Mixing Zone Report," Larry Walker Associates (June 2010) (LWA SRCSD (June 2010)); see also District's October 2010 Comments and Evidence Letter, pp. 81-85.

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the discharge and evidence in the record.[656] Further, the State Board has specified the measure for granting mixing zones:

> While granting a mixing zone is discretionary, in reaching our conclusion we consider that the Regional Board did not fully consider information in the record, the high cost to meet the effluent limitations without allowing this dilution credit, and the lack of evidence of any harm associated with such a mixing zone.[657]

The District performed extensive water quality modeling to determine the extent of actual dilution downstream of the diffuser for the SRWTP discharge. The modeling of the receiving water and mixing zones has been peer reviewed and approved by the Regional Board for use in permit development, including WQBEL calculation.[658]

The State Board also requires consideration of information in the record, the cost of treatment without allowing the dilution credit, and evidence of harm associated with the mixing zone. The District has supplied information demonstrating the proposed acute mixing zone is protective of aquatic life, and that the proposed mixing zones for specific constituents are appropriate and necessary.[659] While the District provided a complete analysis and presentation of the projected costs for various levels of treatment, the costs of treatment associated with denial of the mixing zones was not discussed or considered in the Permit as required.[660] Thus, the information in the Permit fails to provide proper justification for not allowing an acute mixing zone and for denying dilution credits for the other identified constituents.[661] Those denials are inappropriate and the mixing zones should be allowed.

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[656] State Board Order WQO 2004-0013, *supra*, p. 10.

[657] State Board Order WQO 2004-0013, *supra*, p. 12.

[658] See District's October 2010 Comments and Evidence Letter, pp. 81-84; see also Dynamic Model Acceptance Letter.

[659] Technical Memorandum, "Mixing Zones and the Prevention of Acutely Toxic Conditions," to Bob Seyfried and Vyomini Pandya SRCSD (July 13, 2009).

[660] See section IV, *supra*.

[661] Permit, pp. F-28 to F-44.

A. The Denial of an Acute Aquatic Life Mixing Zone Is Not Justified

The Permit finds that the District's proposed acute aquatic life mixing zone of 400 feet wide by 60 feet downstream of the diffuser meets all of the requirements of the SIP.[662] To make this finding, the Permit reviews the eleven SIP criteria and provides a brief explanation for each one as to how and why the acute mixing zone complies. For example, the second SIP criterion states that the acute aquatic life mixing zone shall not "cause acutely toxic conditions to aquatic life passing through the mixing zone."[663] In response, the Permit finds that the minimum float time for passing through the acute aquatic life mixing zone is 2.8 minutes, which is well below U.S. EPA's recommended float time of 15 minutes.[664] The Permit also finds that compliance with the acute toxicity effluent limit based on acute bioassays using 100% effluent will ensure that acutely toxic conditions to aquatic life passing through the acute mixing zone do not occur.[665]

Yet, despite these Permit findings, an acute aquatic life mixing zone is denied in general because of unexplained "concerns with aquatic toxicity in the Delta . . . ."[666] The Permit further concludes that an acute aquatic life mixing zone is not allowed because the Delta is impaired for unknown toxicity and has experienced significant declines in Delta fish populations, i.e., the POD.[667] Such a statement contradicts the Permit finding that the mixing zone would not cause acutely toxic conditions to aquatic life passing through the mixing zone. If the mixing zone is not acutely toxic to passing organisms, it is difficult to ascertain how the granting of such a mixing zone would further cause concerns with acute aquatic toxicity in the Delta downstream of the mixing zone. Moreover, the Permit wholly fails to include any references or information that identify or link the alleged aquatic toxicity downstream in the Delta to allowing an acute mixing zone for aquatic life for the SRWTP discharge.

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[662] Permit, pp. F-34 to F-36.

[663] SIP, p. 17.

[664] Permit, p. F-34.

[665] Permit, pp. F-34 through F-35 (the Permit references the "chronic" mixing zone, however, this appears to be in error as the discussion in question is specific to the acute mixing zone).

[666] Permit, p. F-36.

[667] Permit, p. F-36.

Generally, in accordance with the TSD, mixing zones are allocated for types of criteria or objectives. If it can be demonstrated that the acute mixing zone is sufficiently sized to prevent any acute toxicity to organisms passing though the zone, the acute mixing zone is considered protective of the aquatic life beneficial use.[668] Thus, if the acute mixing zone is sufficiently sized to comply with the SIP, Basin Plan, and U.S. EPA regulations and guidance for ensuring the intended level of protection for the aquatic life beneficial use, the Regional Board should find the mixing zone appropriate and approve it for use in derivation of effluent limits for the discharge.

As the Permit finds, the acute aquatic life mixing zone complies with the SIP.[669] To deny the allowance of the acute mixing zone after making such a finding is completely at odds with this finding and unreasonable. The Regional Board must explain its conclusion in the Permit.[670] This has not occurred.

Furthermore, the proposed acute mixing zone for the District's discharge has been established in a manner that is consistent with acute mixing zones granted by the Regional Board in other NPDES permits. The denial of an acute mixing zone here, without proper cause, is inconsistent with the Regional Board's practice of granting acute mixing zones to other POTWs.[671]

B. The Regional Board Improperly Denied the Use of a Dynamic Model For Copper

The Permit finds that assimilative capacity for copper is available but does not include final WQBELs based on assimilative capacity or dynamic modeling because dilution credits are deemed not necessary.[672] Instead, the Permit includes end-of-pipe WQBELs for copper using a steady state effluent limit derivation approach. The differences in the limits derived from the dynamic model as compared to the steady state approach are as follows: 7.7 μg/L AMEL and

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[668] SIP, p. 17.

[669] Permit, pp. F-34 to F-36.

[670] State Board Order No. WQ 95-4, *supra*, pp. 10, 21-22.

[671] See, e.g., Order Nos. R5-2009-0074 (City of Angels), R5-2009-0078 (Chester Public Utilities District), R5-2010-0019 (City of Chico), R5-2008-0179 (Discovery Bay CSD); see also District's October 2010 Comments and Evidence Letter, pp. 76-77.

[672] Permit, p. F-41.

9.8 μg/L MDEL; and, 7.3 μg/L AMEL and 9.3 μg/L MDEL, respectively. Although differences between the limits appear to be modest, failure to use the dynamic model results may put the District in jeopardy for noncompliance. Specifically, due to concerns of concentrating constituents via water conservation, the copper concentrations in the SRWTP effluent may increase in the future and may exceed the steady state limits adopted into the Permit.[673] Thus, the determination that the steady state limits are appropriate because the District can meet them currently fails to consider near-term future conditions. The failure to use the approved dynamic model to calculate effluent limits for copper is not justified by the findings in the Permit or evidence in the record.

Regional Board staff accepted the District's dynamic modeling tool as being appropriate for use in the NPDES permit renewal process, stating:

> Based on the results of the extensive reviews and validation studies that have been performed, Regional Water Board staff will proceed to use the District's modeling tools for the NPDES permit renewal process. Specifically, the tools are judged to be suitable for use in the dynamic near field modeling of the District's discharge and the derivation of water quality based effluent limits (WQBELs). Use of the dynamic modeling approach for derivation of WQBELs is specifically authorized in the State Implementation Plan (SIP) and in the USEPA Technical Support Document (TSD) for Water Quality-based Toxics Control.[674]

As the District's models were developed in a sound and scientifically defensible manner, with extensive review by Regional Board staff and the Regional Board's independent modeling experts,[675] the results of the models indicating concentrations and compliance with the magnitude, duration, and frequency of the criteria and objectives are accurate and defensible. U.S. EPA guidance states, "[d]ynamic models make best use of the specified magnitude, duration, and frequency of water quality criteria and thereby provide a more accurate calculation of discharge impacts on ambient water quality . . . . [I]f adequate receiving water flow and effluent concentration data are available to estimate frequency distributions, EPA recommends that one of the dynamic wasteload allocation modeling techniques be used to derive wasteload allocations

[673] District's October 2010 Comments and Evidence Letter, p. 87.

[674] Dynamic Model Acceptance Letter.

[675] See, e.g., Dynamic Model Acceptance Letter.

[i.e. effluent limits] which will more exactly maintain water quality standards."[676] Where available, a dynamic model is preferable to a steady state model, as the dynamic approach is a more robust and accurate representation of the conditions in the receiving water.

Thus, effluent limits calculated using the dynamic models are more accurate and reflective of ambient water quality in the vicinity of the discharge. If adequate data and dynamic modeling tools and results are available, it is inappropriate to evaluate effluent limits using a steady state approach *as was done here for copper*. The steady state and dynamic approaches are not equivalent; the dynamic approach is acknowledged as being superior in all respects.

The effluent limits shown in Table F-11 of the Permit and calculated using the dynamic model based on acute and chronic mixing zones are protective of beneficial uses, attainable based on plant performance, and calculated using the most robust and accurate approach available.[677] The Regional Board should have adopted these as the appropriate effluent limits for copper.

C. The Regional Board Improperly Denied Acute Aquatic Life Dilution Credits for Cyanide

For cyanide, the Permit grants a dilution credit based on available chronic aquatic life dilution.[678] Conversely, acute dilution is not allowed because the Permit finds that it is not needed.[679] Although a dilution credit based on chronic aquatic life is allowed, the Permit does not incorporate WQBELs calculated from the dynamic model but instead calculates a performance-based limit. For example, using the dynamic model and granting only a chronic aquatic life mixing zone, the WQBELs for cyanide would be 11 μg/L for the AMEL and 22 μg/L for the MDEL. Without any discussion or rationale, the Regional Board finds that granting dilution credits based on the dynamic models could allocate an unnecessarily large portion of the receiving water's assimilative capacity for cyanide and violate the antidegradation policy.[680]

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[676] Memorandum from Martha G. Prothro to Water Management Division Directors, Regions I-X, re: Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria, Attachment #3, Guidance Document on Dynamic modeling and Translators (August 1993) (Prothro Guidance Document).

[677] Permit, p. F-41.

[678] Permit, p. F-41.

[679] Permit, p. F-41.

[680] Permit, p. F-66.

Based on this vague and unsubstantiated finding, the Permit instead includes a MDEL for cyanide of 11 μg/L.[681]

As discussed previously, the use of dynamic models is a superior approach as it provides for a more accurate and reasonable representation of the conditions in the receiving water.[682] Further, when calculating WQBELs, the first step is not to determine what is necessary for compliance, but rather to determine the appropriate WQBEL considering available dilution credits and facts of the specific discharge under consideration. When there are significant differences between the calculated WQBEL and plant performance, the Regional Board appropriately may reserve some portion of assimilative capacity. When exercising this discretion, the Regional Board must explain its actions in the findings.[683] Moreover, if the Regional Board's justification is because of potential violations to the antidegradation policy, then the Regional Board must explain this rationale.[684] This has not occurred.[685]

Further, the Permit indicates that for cyanide, discharges from the SRWTP use only 2.3% of the assimilative capacity of the Sacramento River.[686] Based on this information, it is difficult to understand how the Regional Board can legitimately find that the granting of the dilution credit, and derivation of effluent limits based on the dilution credit, would "allocate an unnecessarily large portion of the receiving water's assimilative capacity," and "violate the Antidegradation Policy."[687]

With respect to the adopted performance-based limit and the conclusion that no more is needed, the Regional Board failed to consider the significant modifications to the SRWTP that would occur based on other adopted Permit limits and the impact of water conservation and

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[681] Permit, pp. F-13, F-66.

[682] See section IX.B, *supra*.

[683] State Board Order WQO 2004-0013, *supra*, p. 13 ("The issue is not that the Regional Board has the burden of proof in denying mixing zones, but that it must explain its actions in the findings.").

[684] State Board Order WQO 2004-0013, *supra*, p. 13.

[685] See Permit, p. F-66.

[686] See Permit, Table F-18, p. F-98.

[687] Permit, p. F-66; see section VIII, *supra*; see also District's October 2010 Comments and Evidence Letter, pp. 61-62.

growth on effluent levels of cyanide. Both of these are unknown factors, and it is uncertain how such dramatic changes may impact effluent levels of cyanide and future compliance with effluent limits.[688]

D. The Regional Board Improperly Denied Dilution Credits for Chlorpyrifos and Diazinon

The Permit includes a combined effluent limit for chlorpyrifos and diazinon based on waste load allocations (WLAs) contained in the Basin Plan.[689] The TSO finds that the SRWTP cannot consistently comply with the effluent limits, and protects the District from mandatory minimum penalties for a period of up to five years.[690] The Permit denies dilution credits, claiming that because dischargers must meet the WLA, no dilution credits can be granted for compliance with the water quality objectives for chlorpyrifos and diazinon.[691] The Permit also states that, "[t]he WLA have been adopted in the Basin Plan as water quality objectives and dilution are [sic] not allowed."[692] The Regional Board's denial of dilution credits here is improper for various reasons. First, the WLA is not an adopted Basin Plan water quality objective. The specific water quality objectives for chlorpyrifos and diazinon applicable to the Delta are contained in Table III-2A of the Basin Plan.[693] They are specific numeric values that include maximum concentrations for 1-hour (acute) and 4-day (chronic) averaging periods.[694] In contrast, the WLA is included in the Implementation Plan and states as follows: "The waste load allocations (WLA) for all NPDES-permitted dischargers, load allocations (LA) for nonpoint source discharges, and the loading capacity of each of the Sacramento-San Joaquin Delta

[688] District's October 2010 Comments and Evidence Letter, pp. 87, 98.

[689] Permit, pp. F-68 to F-69; see Basin Plan, pp. III-6.01, IV-26.00 to IV-26.01.

[690] TSO, pp. 3, 5.

[691] Permit, p. F-68.

[692] Permit, p. F-42.

[693] Basin Plan, p. III-6.01.

[694] Basin Plan, p. III-6.01.

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Waterways . . . shall not exceed the sum (S) of one (1) as defined below. [equation in the original]."[695]

In addition, when adopting effluent limits to protect numeric water quality criteria (the water quality objectives for chloryprifos), the effluent limitations need to be "*consistent with* the assumptions and requirements of any available [WLA] for the discharge."[696] The effluent limitation need not mirror or exactly replicate the WLA. In this case, the Basin Plan does not specifically state that mixing zones shall be denied and dilution credits not considered when implementing the collective WLA for chlorpyrifos and diazinon. Further, determinations of impairment alone (the basis for adoption of a WLA) are not sufficient for denial of a dilution credit. The State Board has stated as follows: "In Order No. WQO 2001-06 (Tosco), we addressed this same issue. There, we stated that 'the listing itself is only suggestive; it is not determinative.' We stated that in developing effluent limitations, regional boards must review available ambient data and base their determinations on those data."[697] By extension, denial of assimilative capacity based on the existence of the WLA. Merely because a WLA is an adopted part of the Basin Plan does not mean there is no assimilative capacity for the constituent of concern. In this case, there is assimilative capacity available and a dilution credit should be granted in the determination of effluent limits for chlorpyrifos and diazinon.

At the very least, the Regional Board has an affirmative duty to explain its rationale for denying dilution in the Permit and why an effluent limit that is designed to be consistent with the WLA automatically means that dilution credits must be denied.[698] The Permit does not contain any such rationale or explanation.

E. The Regional Board Improperly Denied a Chronic Toxicity Trigger of 13.3 TUc

The State Board should determine that the appropriate toxicity trigger for whole effluent toxicity (WET) is 13.3 TUc.

[695] Basin Plan, p. IV-36.03.01.

[696] 40 C.F.R. § 122.44(d)(1)(vii)(B), emphasis added.

[697] State Board Order WQO 2004-0013, *supra*, p. 14.

[698] See State Board Order No. WQ 95-4, *supra*, pp. 10, 21-22.

The Permit includes provisions for chronic WET that are designed to ensure compliance with the Basin Plan's narrative toxicity objective.[699] Included in the chronic WET provisions is a numeric toxicity monitoring trigger of 8 TUc (where TUc=100/NOEc).[700] If chronic toxicity in the effluent exceeds the trigger level of 8 TUc, the District must begin accelerated monitoring and initiate a toxicity reduction evaluation.[701] Based on the District's dynamic modeling results, the appropriate chronic toxicity trigger at the edge of the chronic mixing zone is 13.3 TUc, a fact which is explicitly acknowledged in the Permit Fact Sheet.[702] However, for no valid reason, the Permit includes a toxicity trigger set at 8.0 TUc. At most, the Permit states that the trigger is set to 8.0 TUc because that is what was in the previous permit and the District has shown consistent compliance with this trigger.[703] The Permit fails to provide any rationale or reasonable explanation as to why the dynamic modeling results should be ignored. Like with the application of mixing zones to specific constituents, the Regional Board must explain its denial of dilution credits here (i.e., difference between 8.0 TUc and 13.3 TUc) based on the facts of the discharge.[704] This has not occurred.

Further, the Permit includes a study requirement to determine if it is feasible to use *Hyallela azteca* for both acute and chronic toxicity.[705] Assuming *arguendo* that it is feasible to use *Hyallela azteca* for chronic WET testing, it is possible that the chronic trigger of 8.0 TUc will not be sufficient and the District may not comply with a chronic toxicity trigger of 8.0 TUc.[706] Failure to meet the chronic toxicity trigger results in the need to conduct accelerated monitoring and initiate a toxicity reduction evaluation (TRE), which are costly endeavors. Such costs are improper, especially considering that additional available chronic dilution for chronic toxicity

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699 Permit, pp. 26-28.

700 Permit, p. 27.

701 Permit, p. 27.

702 Permit, p. F-112.

703 Permit, p. F-112.

704 State Board Order WQO 2004-0013, *supra*, p. 10.

705 Permit, pp. 28-29.

706 See Permit, p. F-111.

exists. Thus, denial by the Regional Board was improper because it did not fully consider all information in the record.[707]

X. THE PERMIT MONITORING REQUIREMENT FOR NDMA VIOLATES FEDERAL REGULATIONS AND THE SIP

The State Board should determine that the Permit requires an improper method for monitoring of NDMA. In section IV.A.1.a (Table 6), the Permit establishes, for the first time, effluent limitations for NDMA for the SRWTP.[708] The Monitoring and Reporting Program (MRP) of the Permit requires the District to conduct effluent monitoring for NDMA using U.S. EPA Method 521.[709] U.S. EPA Method 521 provides procedures for "the determination of nitrosamines in finished drinking water."[710] The method has not been evaluated for untreated source waters and other types of water supplies.[711]

More importantly, requiring effluent testing for NDMA using U.S. EPA Method 521 violates federal regulations and the SIP without the District's consent. When requiring monitoring to determine compliance with permit effluent limits, monitoring must be required, "[a]ccording to test procedures approved under 40 C.F.R. Part 136 for the analyses of pollutants or another method is required under 40 C.F.R. subchapters N or O."[712] When there are no approved methods under 40 C.F.R. Part 136, monitoring must be conducted according to a test procedure specified in the Permit.[713] For NDMA, 40 C.F.R. Part 136 identifies multiple approved methods— U.S. EPA Method 521 is not one of them.[714] The SIP allows for alternative test methods in specified circumstances, including: "[w]hen the discharger and the RWQCB agree to

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[707] State Board Order WQO 2004-0013, *supra*, p. 12.

[708] Permit, p. 14.

[709] Permit, p. E-6.

[710] Method 521, Determination of Nitrosamines in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography with Large Volume Injection and Chemical Ionization Tandem Mass Spectrometry (MS/MS) (September 2004), U.S. EPA Document # EPA/600/R-05/054 (U.S. EPA Method 521), p. 521-2.)

[711] U.S. EPA Method 521, p. 521-2.

[712] 40 C.F.R. § 122.44(i)(1)(iv).

[713] 40 C.F.R. § 122.44(i)(1)(iv).

[714] 40 C.F.R. § 136.3, Table IC.

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include in the permit a test method that is more sensitive than those specified in 40 CFR 136 (revised as of July 3, 1999)."

Compliance with the procedures identified in 40 C.F.R. Part 136 is approved pursuant to the federal regulations, or required when submitting reports under an NPDES Permit unless an alternate test procedure is agreed to by the discharger and the Regional Board.[715] The District has not agreed at this time to include U.S. EPA Method 521 as an alternative to those methods approved in Part 136 for NDMA.[716] Further, there is no evidence to suggest that U.S. EPA Method 521 has been approved pursuant to the federal regulations. Accordingly, requiring the use of U.S. EPA Method 521 to monitor effluent for NDMA without the District's consent violates the SIP and federal regulations and must be removed. Regional Board staff commented that the District has previously used U.S. EPA Method 521 for NDMA.[717] However, previous District monitoring using U.S. EPA Method 521 is irrelevant because it was not required by the previous permit and was not conducted to ensure compliance with effluent limitations. Thus, previous monitoring was not required to comply with the regulations in the SIP or 40 C.F.R. Part 136. The MRP is inconsistent with those regulations.

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[715] 40 C.F.R. §§ 136.4-136.5.

[716] District's October 2010 Comments and Evidence Letter, p. 106.

[717] Staff Response to Comments, p. 67.

XI. CONCLUSION

For the foregoing reasons, Petitioner requests that the State Board grant the relief requested herein.

SOMACH SIMMONS & DUNN
A Professional Corporation

DATED: January 10, 2011

By: [signature]
Paul S. Simmons
Attorneys for Petitioner
SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT

OFFICE OF THE COUNTY COUNSEL

DATED: January 10, 2011

By: [signature]
Lisa A. Travis
Attorneys for Petitioner
SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT

PROOF OF SERVICE

I am employed in the County of Sacramento; my business address is 500 Capitol Mall, Suite 1000, Sacramento, California; I am over the age of 18 years and not a party to the foregoing action.

On January 10, 2011, I served a true and correct copy of:

PETITION FOR REVIEW
(Wat. Code, § 13320),

XXX (by mail) on all parties in said action, in accordance with Code of Civil Procedure §1013a(3), by placing a true copy thereof enclosed in a sealed envelope, with postage fully paid thereon, in the designated area for outgoing mail, addressed as set forth below.

Pamela Creedon, Executive Officer
Regional Water Quality Control Board,
Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670

Kenneth D. Landau, Assistant Executive Officer
Regional Water Quality Control Board,
Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670

On January 10, 2011, I also provided a **courtesy copy** of the **PETITION FOR REVIEW (Wat. Code, § 13320)** (and its accompanying Exhibits) on compact disc (CD) by mail on the following individuals/entities:

David P. Coupe, Staff Counsel
c/o San Francisco Bay Regional Water Quality
Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

"WATER AGENCIES"

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, ZONE 7 (Zone 7)

G.F. Duerig, General Manager
Alameda County Flood Control and Water
Conservation District, Zone 7
100 North Canyons Parkway
Livermore, CA 94551-9486

Richard "Ren" E. Nosky, General Counsel
Alameda County Flood Control and Water
Conservation District, Zone 7
Downey Brand
3425 Brookside Road, Suite A
Stockton, CA 95219

David Aladjem, Esquire
Downey Brand
621 Capitol Mall, 18th Floor
Sacramento, CA 95814

ALAMEDA COUNTY WATER DISTRICT (ACWD)

Walter L. Wadlow, General Manager
Alameda County Water District
P.O. Box 5110
Fremont, CA 94537-5110

Michael B. McNaughton
Hanson Bridgett LLP
425 Market Street, 26th Floor
San Francisco, CA 94105

CALIFORNIA SPORTFISHING PROTECTION ALLIANCE (CSPA)

Bill Jennings, Executive Director
California Sportfishing Protection Alliance
3536 Rainier Avenue
Stockton, CA 95204

CAMPBELL SOUP COMPANY

Brett Buatti
Vice President, Manufacturing
Campbell Soup Co., Sacramento Operations
6200 Franklin Boulevard
Sacramento, CA 95824

CENTRAL VALLEY CLEAN WATER ASSOCIATION (CVCWA)

Debbie Webster, Executive Officer
Central Valley Clean Water Association
P.O. Box 1755
Grass Valley, CA 95945

CONTRA COSTA WATER DISTRICT (CCWD)

Jerry Brown, General Manager
Contra Costa Water District
P.O. Box H2O
Concord, CA 94524

Robert B. Maddow, General Counsel
Bold Polisnr Maddow et al.
500 Ygnacio Valley Road, Suite 325
Walnut Creek, CA 94596

KERN COUNTY WATER AGENCY (KCWA)

James M. Beck, General Manager
Kern County Water Agency
P.O. Box 58
Bakersfield, CA 93302-0058

Amelia Minaberrigarai, General Counsel
Kern County Water Agency
P.O. Box 58
Bakersfield, CA 93302-0058

Eric N. Robinson, Esquire
Kronick, Moskovitz, Tiedemann & Girard
400 Capitol Mall, 27th Floor
Sacramento, CA 95814-4416

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA (MWD)

Adam C. Kear, Sr. Deputy General Counsel
The Metropolitan Water District
of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153

NORTH STATE BUILDING INDUSTRY ASSOCIATION

Dennis M. Rogers, Senior Vice President
Governmental and Public Affairs
North State Building Industry Association
1536 Eureka Road
Roseville, CA 95661-3055

SAN LUIS & DELTA-MENDOTA WATER AUTHORITY (SLDMWA)

Jon D. Rubin, Esquire
Diepenbrock Harrison
400 Capitol Mall, Suite 1800
Sacramento, CA 95814

SANTA CLARA VALLEY WATER DISTRICT (SCVWD)

Beau Goldie, Chief Executive Officer
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

Anthony Fulcher, Assistant District Counsel
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

STATE WATER CONTRACTORS (SWC)

Terry Erlewine, General Manager
State Water Contractors
1121 L Street, Suite 1050
Sacramento, CA 95814

Eric N. Robinson, Esquire
Kronick, Moskovitz, Tiedemann & Girard
400 Capitol Mall, 27th Floor
Sacramento, CA 95814-4416

WESTLANDS WATER DISTRICT (Westlands)

Craig Manson, General Counsel
Westlands Water District
P.O. Box 6056
Fresno, CA 93703

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 10, 2011, at Sacramento, California.

Crystal Rivera

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EXHIBIT A

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

CENTRAL VALLEY REGION

11020 Sun Center Drive, #200 Rancho Cordova, California 95670-6114
Phone (916) 464-3291 • Fax (916) 464-4645
http://www.waterboards.ca.gov/centralvalley

ORDER NO. R5-2010-0114
NPDES NO. CA0077682

WASTE DISCHARGE REQUIREMENTS FOR THE SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT SACRAMENTO COUNTY

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 1. Discharger Information

Discharger	Sacramento Regional County Sanitation District
Name of Facility	Sacramento Regional Wastewater Treatment Plant
Facility Address	8521 Laguna Station Road
	Elk Grove, CA 95758
	Sacramento County
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

The discharge by the **Sacramento Regional County Sanitation District** from the discharge points identified below is subject to waste discharge requirements as set forth in this Order:

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Disinfected Secondary Treated Wastewater	38° 27' 15" N	121° 30' 00" W	Sacramento River

Table 3. Administrative Information

This Order was adopted by the Regional Water Quality Control Board on:	**9 December 2010**
This Order shall become effective on:	**50 days after the Adoption Date of this Order**
This Order shall expire on:	**1 December 2015**
The Discharger shall file a Report of Waste Discharge in accordance with title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than:	**180 days prior to the Order expiration date**

I, **Pamela C. Creedon**, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on **9 December 2010**.

Original Signed By

Pamela C. Creedon, Executive Officer

EXHIBIT A

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List of Tables

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I. FACILITY INFORMATION

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 4. Facility Information

Discharger	Sacramento Regional County Sanitation District
Name of Facility	Sacramento Regional Wastewater Treatment Plant, Elk Grove
Facility Address	8521 Laguna Station Road
	Elk Grove, CA 95758
	Sacramento
Facility Contact, Title, and Phone	Stanley R. Dean, District Engineer, (916) 875-9101
Mailing Address	10060 Goethe Road, Sacramento, CA 95827
Type of Facility	Publicly Owned Treatment Works
Facility Design Flow	181 Million Gallons per Day (MGD) (Permitted Average Dry Weather Flow)

II. FINDINGS

The California Regional Water Quality Control Board, Central Valley Region (hereinafter Central Valley Water Board), finds:

A. Background. Sacramento Regional County Sanitation District (hereinafter Discharger) is currently discharging pursuant to Order No. 5-00-188 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0077682. The Discharger submitted a Report of Waste Discharge, dated 1 February 2005, and applied for a NPDES permit renewal to discharge up to 218 mgd of treated wastewater from Sacramento Regional Wastewater Treatment Plant, hereinafter Facility. In June 2010, the Discharger withdrew its request to increase the treatment plant capacity from 181 mgd to 218 mgd.

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

The Discharger provides sewerage service to the Cities of Sacramento, Folsom, West Sacramento, and the Sacramento Area Sewer District service area. The Sacramento Area Sewer District service area includes the Cities of Elk Grove, Rancho Cordova, Citrus Heights, Courtland, and Walnut Grove, as well as, portions of the unincorporated areas of Sacramento County. The population served is approximately 1.3 million people. The Discharger owns and operates the main trunk lines/interceptors feeding the Facility. The smaller diameter collection systems are owned and operated by the various contributing agencies and not by the Discharger. This Order regulates the Facility only. The collection systems that feed the Facility are regulated under the State Water Resources Control Board's Water Quality Order No. 2006-0003.

The Facility is contracted to accept 60 mgd of wastewater and storm runoff from the downtown Sacramento combined collection system. Combined collection flows are managed by the Combined Wastewater Collection and Treatment System (CWCTS) operated by the City of Sacramento. The CWCTS is governed by Waste Discharge Requirements Order No.R5-2010-0004 (NPDES No. CA0079111). Depending on treatment and conveyance capacity, flow in excess of 60 mgd maybe received at the Facility.

B. Facility Description. The Discharger owns and operates the Facility, a Publicly Owned Treatment Works (POTW). The treatment system consists of mechanical bar screens, aerated grit removal, primary sedimentation, pure oxygen activated sludge aeration, secondary clarification, chlorine disinfection with dechlorination and a diffuser for river discharge. Solids handling consists of dissolved air flotation thickeners, gravity belt thickeners, anaerobic digesters and sludge stabilization basins with disposal on-site through land application or biosolids recycling facility. Wastewater is discharged from Discharge Point No. 001 (see table on cover page) to the Sacramento River at Freeport, a water of the United States, and within the legal boundaries of the Sacramento – San Joaquin Delta. Attachment B provides a map of the area around the Facility. Attachment C provides a flow schematic of the Facility.

The Discharger currently provides 5.0 MGD of treated wastewater to the Water Reclamation Facility (WRF) for unrestricted use, with a provision for Facility expansion to 10 MGD. The WRF is regulated under the Master Reclamation Permit No. 97-146 and provides recycled water for landscape irrigation and wastewater treatment plant process water.

As part of Waste Discharge Requirements (WDR) Order No. 98-087, a corrective action program (CAP) was initiated by the Discharger. The CAP is to address elevated constituent concentrations that were observed in samples from groundwater monitoring wells down gradient of the Dedication Land Disposal areas (DLDs) and the Class III landfill when compared to upgradient groundwater monitoring wells. Extraction wells are used for hydraulic control of the site. Characterization of the groundwater aquifer is documented in the reports submitted twice annually pursuant to WDR Order No. 98-087. The Discharger conveys the extracted groundwater from the CAP extraction wells, estimated at approximately 1.0 MGD, to the Facility effluent channel downstream of the secondary clarifiers and upstream of the plant chlorination station or onsite constructed wetlands. Discharging water from the CAP system downstream of the secondary clarifiers is acceptable and does not decrease the amount of treatment as the treatment processes upstream of this discharge point are not designed for removal of the CAP discharge constituents of concern. Furthermore, based on the extracted groundwater sampling, estimates of CAP discharge constituent concentrations are either below current Facility effluent concentrations or do not have a reasonable potential to violate water quality objectives in the receiving water. Based on these considerations, the Board finds disposal of CAP discharge as described above to be acceptable.

C. Legal Authorities. This Order is issued pursuant to section 402 of the Clean Water Act (CWA) and implementing regulations adopted by USEPA and chapter 5.5, division 7 of the California Water Code (CWC; commencing with section 13370). It shall serve as a NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to Article 4, Chapter 4, Division 7 of the CWC (commencing with section 13260).

D. Background and Rationale for Requirements. The Central Valley Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for Order requirements, is hereby incorporated into this Order and constitutes part of the Findings for this Order. Attachments A through K are also incorporated into this Order.

E. California Environmental Quality Act (CEQA). Under CWC section 13389, this action to adopt an NPDES permit is exempt from the provisions of CEQA, Public Resources Code sections 21100-21177.

F. Technology-based Effluent Limitations. Section 301(b) of the CWA and implementing USEPA permit regulations at section 122.44, title 40 of the Code of Federal Regulations (40 CFR 122.44), require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 CFR Part 133. A detailed discussion of the technology-based effluent limitations development is included in the Fact Sheet.

G. Water Quality-Based Effluent Limitations (WQBELs). Section 301(b) of the CWA and 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. This Order contains requirements, expressed as water quality-based requirements that are necessary to achieve water quality standards. The Regional Water Board considered the factors listed in CWC section 13241 in establishing these requirements. The rationale for these requirements, which consist of tertiary treatment or equivalent requirements, is discussed in the Fact Sheet.

40 CFR 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBELs must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

H. Water Quality Control Plans. The Central Valley Water Board adopted a *Water Quality Control Plan, Fourth Edition (Revised September 2009)*, for the Sacramento and

San Joaquin River Basins (hereinafter Basin Plan) on 9 December 1994 that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Resources Control Board (State Water Board) Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Discharge to 001 is within the legal boundaries of the Sacramento-San Joaquin Delta. Beneficial uses applicable to the Sacramento –San Joaquin Delta are as follows:

Table 5. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	**Sacramento – San Joaquin Delta**	Existing: Municipal and domestic supply (MUN); Agricultural supply, including irrigation and stock watering (AGR); Industrial process supply (PROC); Industrial service supply (IND); Water contact recreation, including canoeing and rafting (REC-1); Non-contact water recreation (REC-2); Warm freshwater habitat (WARM); Cold freshwater habitat (COLD); Migration of aquatic organisms, warm and cold (MIGR); Spawning, reproduction, and/or early development, warm (SPWN); Wildlife habitat (WILD); and Navigation (NAV).
NA	**Groundwater**	Municipal and domestic water supply (MUN); Agricultural supply (AGR); Industrial service supply (IND); and Industrial process supply (PRO).

The Basin Plan includes a list of Water Quality Limited Segments (WQLSs), which are defined as "...those sections of lakes, streams, rivers or other fresh water bodies where water quality does not meet (or is not expected to meet) water quality standards even after the application of appropriate limitations for point sources (40 CFR 130, et seq.)." The Basin Plan also states, "Additional treatment beyond minimum federal standards will be imposed on dischargers to WQLSs. Dischargers will be assigned or allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment." The Delta is listed as a WQLS for Chlorpyrifos, DDT, Diazinon, Exotic Species, Group A Pesticides, Mercury, Polychlorinated byphenyls (PCBs) and unknown toxicity in the 303(d) list of impaired water bodies.

The State Water Board adopted the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California (Thermal Plan) on 18 May 1972, and amended this plan on 18 September 1975. This plan contains temperature objectives for surface waters. Requirements of this Order implement the Thermal Plan.

The Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan) was adopted on 13 December 2006 by the State Water Board superseding the May 1995 and the 1991 Bay-Delta Plan. The Bay-Delta Plan identifies the beneficial uses of the estuary and includes objectives for flow, salinity, and endangered species protection.

The Bay-Delta Plan attempts to create a management plan that is acceptable to the stakeholders while at the same time is protective of beneficial uses of the Sacramento – San Joaquin Delta. The State Water Board adopted Decision 1641 (D-1641) on 29 December 1999. D-1641 implements flow objectives for the Bay-Delta Estuary, approves a petition to change points of diversion of the Central Valley Project and the State Water Project in the Southern Delta, and approves a petition to change places of use and purposes of use of the Central Valley Project. The water quality objectives of the Bay-Delta Plan are implemented as part of this Order.

The Sacramento River at Freeport is within the designated critical habitat for five federally-listed fish species including winter- and spring-run Chinook salmon (Oncorhynchus tshawytscha), Steelhead (O. mykiss), Delta smelt (Hypomesus transpacificus) and Green sturgeon (Acipenser medirostris). Other listed wildlife species that feed on Central Valley fishes include the California Least Tern (Stenula antillarum brownie) and the Giant Garter snake (Thamnopsis gigas). In addition to the federally-listed species the California State Species of Special Concern include the Sacramento Splittail (Pogonichthys macrolepidotus) and the Central Valley Fall/Late-Fall Salmon (Oncorhynchus tshawytscha).

Requirements of this Order specifically implement the applicable Water Quality Control Plans.

The Central Valley Water Board adopted Resolution No. R5-2007-0161, Water Board's Actions to Protect Beneficial Uses of the San Francisco Bay/Sacramento- San Joaquin Delta Estuary on 6 December 2007. The purpose of the resolution is to identify and implement actions needed to protect the San Francisco/San Joaquin Delta beneficial uses. Some actions include exercising the State Water Board's water rights authority over water right decisions and exercising the San Francisco Bay Regional Water Quality Control Board's and Central Valley Water Board's authority over controlling water quality in the Delta.

I. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on 22 December 1992, and later amended it on 4 May 1995 and 9 November 1999. About 40 criteria in the NTR applied in California. On 18 May 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on 13 February 2001. These rules contain water quality criteria for priority pollutants.

J. **State Implementation Policy.** On 2 March 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed*

Bays, and Estuaries of California (State Implementation Policy or SIP). The SIP became effective on 28 April 2000 with respect to the priority pollutant criteria promulgated for California by USEPA through the NTR and to the priority pollutant objectives established by the Central Valley Water Board in the Basin Plan. The SIP became effective on 18 May 2000 with respect to the priority pollutant criteria promulgated by USEPA through the CTR. The State Water Board adopted amendments to the SIP on 24 February 2005 that became effective on 13 July 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

K. **Compliance Schedules and Interim Requirements.** In general, an NPDES permit must include final effluent limitations that are consistent with CWA section 301 and with 40 CFR 122.44(d). There are exceptions to this general rule. The State Water Board has concluded that where the Regional Water Board's Basin Plan allows for schedules of compliance and the Regional Water Board is newly interpreting a narrative standard, it may include schedules of compliance in the permit to meet effluent limits that implement a narrative standard. See In the Matter of Waste Discharge Requirements for Avon Refinery (State Water Board Order WQ 2001-06 at pp. 53-55). See also Communities for a Better Environment (CBE) et al. v. State Water Resources Control Board, 34 Cal.Rptr.3d 396, 410 (2005). The Basin Plan for the Sacramento and San Joaquin Rivers includes a provision that authorizes the use of compliance schedules in NPDES permits for water quality objectives that are adopted after the date of adoption of the Basin Plan, which was 25 September 1995 (see Basin Plan at page IV-16). Consistent with the State Water Board's Order in the CBE matter, the Regional Water Board has the discretion to include compliance schedules in NPDES permits when it is including an effluent limitation that is a "new interpretation" of a narrative water quality objective. This conclusion is also consistent with USEPA policies and administrative decisions. See, e.g., Whole Effluent Toxicity (WET) Control Policy. The State Water Board's *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits* (Compliance Schedule Policy) allows compliance schedules for new, revised, or newly interpreted water quality objectives or criteria, or in accordance with a TMDL. All compliance schedules must be as short as possible, and may not exceed 10 years from the effective date of the adoption, revision, or new interpretation of the applicable water quality objective or criterion, unless a TMDL allows a longer schedule. The Regional Water Board, however, is not required to include a compliance schedule of compliance, but may issue a Time Schedule Order pursuant to CWC section 13300 or a Cease and Desist Order pursuant to CWC section 13301 where it finds that the discharger is violating or threatening to violate the permit. The Regional Water Board will consider the merits of each case in determining whether it is appropriate to include a compliance schedule in a permit, and, consistent with the Basin Plan Compliance Schedule Policy, should consider feasibility of achieving compliance, and must impose a schedule that is as short as practicable possible to achieve compliance with the objectives, criteria, or effluent limitation based on the objective or criteria.

Section 2.1 of the SIP provides that, based on a Discharger's request and demonstration that it is infeasible for an existing Discharger to achieve immediate compliance with an effluent limitation derived from a CTR criterion, compliance schedules may be allowed in an NPDES permit. Unless an exception has been granted under section 5.3 of the SIP, a compliance schedule may not exceed 5 years from the date that the permit is issued or reissued, nor may it extend beyond 10 years from the effective date of the SIP (or 18 May 2010) to establish and comply with CTR criterion-based effluent limitations. The Compliance Schedule Policy and the SIP do not allow compliance schedules for priority pollutants beyond 18 May 2010, except for new or more stringent priority pollutant criteria adopted by USEPA after 17 December 2008.

Where a compliance schedule for a final effluent limitation exceeds 1 year, the Order must include interim numeric limitations for that constituent or parameter, interim milestones and compliance reporting within 14 days after each interim milestone. The permit may also include interim requirements to control the pollutant, such as pollutant minimization and source control measures. Where allowed by the Basin Plan, compliance schedules and interim effluent limitations or discharge specifications may also be granted to allow time to implement a new or revised water quality objective. This Order does include compliance schedules and interim effluent limitations. A detailed discussion of the basis for the compliance schedules and interim effluent limitations is included in the Fact Sheet (Attachment F).

L. **Alaska Rule.** On 30 March 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards become effective for CWA purposes. (40 CFR 131.21 and 65 FR 24641 (27 April 2000).) Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to USEPA after 30 May 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by 30 May 2000 may be used for CWA purposes, whether or not approved by USEPA.

M. **Stringency of Requirements for Individual Pollutants.** This Order contains both technology-based effluent limitations and WQBELs for individual pollutants. The technology-based effluent limitations consist of restrictions on flow and percent removal requirements for 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) and pH. The WQBELs consist of restrictions on ammonia, copper, cyanide, carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methylene chloride, tetrachloroethylene, pentachlorophenol, bis(2-ethylhexyl) phthalate, dibenzo(ah)anthracene, N-nitrosodimethylamine, aluminum, nitrate, manganese, methyl tertiary butyl ether, mercury, chlorine residual, diazinon, and chlorpyrifos. This Order's technology-based pollutant restrictions implement the minimum, applicable federal technology-based requirements. In addition, this Order includes water quality based effluent limitations for BOD_5, total coliform organisms, and TSS to meet numeric objectives or protect beneficial uses.

WQBELs have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant WQBELs were derived from the CTR, the

CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual WQBELs for priority pollutants are based on the CTR-SIP, which was approved by USEPA on 18 May 2000. All beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to 30 May 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to 30 May 2000, but not approved by USEPA before that date, are nonetheless "*applicable water quality standards for purposes of the [Clean Water] Act*" pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the technology-based requirements of the CWA and the applicable water quality standards for purposes of the CWA.

N. **Antidegradation Policy**. 40 CFR 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Central Valley Water Board's Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. As discussed in detail in the Fact Sheet, the permitted discharge is consistent with the antidegradation provision of 40 CFR 131.12 and Resolution No. 68-16.

O. **Anti-Backsliding Requirements.** Sections 303(d)(4) and 402(o)(2) of the CWA and federal regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions. Some effluent limitations in this Order are less stringent that those in Order No. 5-00-188. As discussed in detail in the Fact Sheet, this relaxation of effluent limitations is consistent with the anti-backsliding requirements of the CWA and federal regulations.

P. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state. The discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

Q. **Monitoring and Reporting.** 40 CFR 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. CWC sections 13267 and 13383 authorize the Central Valley Water Board to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement federal and State requirements. The Monitoring and Reporting Program is provided in Attachment E.

R. Standard and Special Provisions. Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment D. The discharger must comply with all standard provisions and with those additional conditions that are applicable under 40 CFR 122.42. The Central Valley Water Board has also included in this Order special provisions applicable to the Discharger. A rationale for the special provisions contained in this Order is provided in the Fact Sheet.

S. Provisions and Requirements Implementing State Law. The provisions/requirements in sections V.B and VI.C.4.c of this Order are included to implement state law only. These provisions/requirements are not required or authorized under the federal CWA; consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

T. Notification of Interested Parties. The Central Valley Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet of this Order.

U. Consideration of Public Comment. The Central Valley Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet.

THEREFORE, IT IS HEREBY ORDERED, that Order No. 5-00-188 is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions contained in division 7 of the CWC (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal CWA and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order.

III. DISCHARGE PROHIBITIONS

A. Discharge of wastewater at a location or in a manner different from that described in the Findings is prohibited.

B. The by-pass or overflow of wastes to surface waters is prohibited, except as allowed by Federal Standard Provisions I.G. and I.H. (Attachment D), and as described in Finding II.B, for the groundwater Corrective Action Program (CAP).

C. Neither the discharge nor its treatment shall create a nuisance as defined in section 13050 of the CWC.

D. The Discharger shall not allow pollutant-free wastewater to be discharged into the collection, treatment, and disposal system in amounts that significantly diminish the system's capability to comply with this Order. Pollutant-free wastewater means rainfall, groundwater, cooling waters, and condensates that are essentially free of pollutants.

E. Discharge to the Sacramento River is prohibited when the Sacramento River instantaneous flow is less than 1300 cubic feet per second (cfs) at RSWU-001.

F. Discharge to the Sacramento River is prohibited when there is less than a 14:1 (river:effluent) flow ratio over a rolling one-hour period available in the Sacramento River at RSWU-001.

G. The discharge or storage of waste classified as 'hazardous' or 'designated', as defined in California Code of Regulations, title 23, section 2521, subdivision (a) and Water Code section 13173of Title 27, is prohibited.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations – Discharge Point No. 001

Effective immediately unless otherwise specified, the Discharger shall maintain compliance with the following final effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location EFF-001 as described in the Monitoring and Reporting Program.

1. Final Effluent Limitations – Discharge Point No. 001

a. The Discharger shall maintain compliance with the following effluent limitations specified in Table 6:

Table 6. Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Conventional Pollutants						
Biochemical Oxygen Demand, 5-day @ 20°C[2]	mg/L	10	15	20	--	--
	lbs/day[1]	15,100	22,700	30,200	--	--
Total Suspended Solids[2]	mg/L	10	15	20	--	--
	lbs/day[1]	15,100	22,700	30,200	--	--
pH	standard units	--	--	--	6.0	8.0
Priority Pollutants						
Bis(2-ethylhexyl)phthalate	µg/L	--	--	13	--	--
Carbon Tetrachloride	µg/L	--	--	5.3	--	--
Chlorodibromomethane	µg/L	--	--	2.2	--	--
Copper, Total Recoverable	µg/L	7.3	--	9.3	--	--
Cyanide	µg/L	--	--	11	--	--
Dibenzo(ah)anthracene	µg/L	0.2	--	0.4	--	--
Dichlorobromomethane	µg/L	--	--	3.4	--	--

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Methylene Chloride	µg/L	4.7	--	11	--	--
N-nitrosodimethylamine	µg/L	0.00069	--	0.0014	--	--
Pentachlorophenol	µg/L	--	--	18	--	--
Tetrachloroethylene	µg/L	--	--	4.4	--	--
Non-Conventional Pollutants						
Settleable Solids	ml/L	0.1	--	0.2	--	--
Aluminum, Total Recoverable	µg/L	503	--	750	--	--
Ammonia Nitrogen, Total (as N)[2]	mg/L	1.8	--	2.2	--	--
	Lbs/day[1]	2720	--	3320	--	--
Nitrate, Total (as N)	mg/L	10	--	--	--	--
Manganese, Total Recoverable	µg/L	--	--	85	--	--
Methyl Tertiary Butyl Ether	µg/L	--	--	18	--	--

1 Based on a design average dry weather flow of 181 MGD.

2 This Order includes interim effluent limitations for BOD_5, TSS, and Total Ammonia Nitrogen (section IV.A.2.). Effective immediately, the interim effluent limitations shall apply in lieu of final effluent limitations for these constituents. The final effluent limitations for BOD_5, TSS, and Total Ammonia Nitrogen become effective when the Discharger complies with Special Provisions section VI.C.7. or 1 December 2020, whichever is sooner.

b. Percent Removal. The average monthly percent removal of 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) shall not be less than 85 percent.

c. Chronic Whole Effluent Toxicity. There shall be no chronic whole effluent toxicity in the effluent discharge.

d. Acute Whole Effluent Toxicity. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

i. 70%, minimum for any one bioassay; and

ii. 90%, median for any three consecutive bioassays.

e. Temperature. The maximum temperature of the discharge shall not exceed the natural receiving water temperature at RSWU-001 by more than 20°**F** from 1 May through 30 September and more than 25°**F** from 1 October through 30 April.

f. Total Residual Chlorine[1]. Effluent total residual chlorine shall not exceed:

[1] This Order includes interim effluent limitations for total residual chlorine and total coliform organisms (section IV.A.2.). Effective immediately, the interim effluent limitations for these constituents shall apply in lieu of final effluent limitations. The final effluent limitations for total residual chlorine and total coliform organisms

i. 0.011 mg/L, as a 4-day average; and
ii. 0.019 mg/L, as a 1-hour average.

g. Total Coliform Organisms[1]. Effluent total coliform organisms shall not exceed:

i. 2.2 most probable number (MPN) per 100 mL, as a 7-day median;
ii. 23 MPN/100 mL, more than once in any 30-day period; and
iii. 240 MPN/100 mL, at any time.

h. Average Dry Weather Flow. The average dry weather discharge flow shall not exceed 181 mgd.

i. Aluminum, Total Recoverable. Effluent total recoverable aluminum concentrations shall not exceed 200 µg/L as a calendar annual average.

j. Electrical Conductivity. Effluent electrical conductivity shall not exceed 900 µmhos/cm as a calendar annual average.

k. Mercury. For a calendar year, the performance-based interim annual mass load of total mercury shall not exceed 2.2 lbs/year.

l. Chlorpyrifos and Diazinon. Effluent chlorpyrifos and diazinon concentrations shall not exceed the sum of one as defined below:

i. Average Monthly Effluent Limit

$$S_{AMEL} = \frac{C_{D\text{-}avg}}{0.08} + \frac{C_{C\text{-}avg}}{0.012} \leq 1.0$$

$C_{D\text{-}avg}$ = average monthly diazinon effluent concentration in µg/L
$C_{C\text{-}avg}$ = average monthly chlorpyrifos effluent concentration in µg/L

ii. Maximum Daily Effluent Limit

$$S_{MDEL} = \frac{C_{D\text{-}max}}{0.16} + \frac{C_{C\text{-}max}}{0.025} \leq 1.0$$

$C_{D\text{-}max}$ = maximum daily diazinon effluent concentration in µg/L
$C_{C\text{-}max}$ = maximum daily chlorpyrifos effluent concentration in µg/L

become effective when the Discharger complies with Special Provisions section VI.C.7. or 1 December 2020, whichever is sooner.

2. Interim Effluent Limitations – Discharge Point No. 001

The Discharger shall maintain compliance with the following interim effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location EFF-001 as described in the Monitoring and Reporting Program.

a. **Effective immediately and ending on 30 November 2020,** the Discharger shall maintain compliance with the interim effluent limitations specified in Table 7. These interim effluent limitations shall apply in lieu of the corresponding final effluent limitations specified for the same parameters during the time period indicated in this provision:

Table 7. Interim Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Conventional Pollutants						
Biochemical Oxygen Demand, 5-day @ 20°C	mg/L	30	45	60	--	--
	lbs/day[1]	45,286	67,929	90,572	--	--
Total Suspended Solids	mg/L	30	45	60	--	--
	lbs/day[1]	45,286	67,929	90,572	--	--
Non-Conventional Pollutant						
Ammonia Nitrogen, Total (as N)	mg/L	33	35	45	--	--
	lbs/day[1]	49,400	52,920	67,929	--	--
1. Based on a design flow of 181 MGD.						

b. **Total Residual Chlorine[1]. Effective immediately and ending on 30 November 2020,** the effluent total residual chlorine shall not exceed:

i. 0.011 mg/L, as a monthly average; and
ii. 0.018 mg/L, as a daily average.

c. **Total Coliform Organisms[2]. Effective immediately and ending on 30 November 2020,** the total coliform organisms shall not exceed:

i. 23 most probable number (MPN) per 100 mL, as a weekly median; and
ii. 500 MPN/100 mL, in any two consecutive days as a daily maximum.

[1] The final effluent limitations for total residual chlorine become effective when the Discharger complies with Special Provisions section VI.C.7. or 1 December 2020, whichever is sooner.
[2] The final effluent limitations for total coliform organisms become effective when the Discharger complies with Special Provisions section VI.C.7. or 1 December 2020, whichever is sooner.

B. Land Discharge Specifications – Not Applicable

C. Reclamation Specifications – Not Applicable

V. Receiving Water Limitations

A. Surface Water Limitations

Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this Order. The discharge shall not cause the following in the Sacramento River and Sacramento-San Joaquin Delta:

1. **Bacteria.** The fecal coliform concentration, based on a minimum of not less than five samples for any 30-day period, to exceed a geometric mean of 200 MPN/100 mL, nor more than 10 percent of the total number of fecal coliform samples taken during any 30-day period to exceed 400 MPN/100 mL.

2. **Biostimulatory Substances.** Water to contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.

3. **Chemical Constituents.** Chemical constituents to be present in concentrations that adversely affect beneficial uses.

4. **Color.** Discoloration that causes nuisance or adversely affects beneficial uses.

5. **Dissolved Oxygen**: The dissolved oxygen concentration to be reduced below 7.0 mg/L at any time.

6. **Floating Material.** Floating material to be present in amounts that cause nuisance or adversely affect beneficial uses.

7. **Oil and Grease.** Oils, greases, waxes, or other materials to be present in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.

8. **pH.** The pH to be depressed below 6.5 nor raised above 8.5.

9. **Pesticides**:

   a. Pesticides to be present, individually or in combination, in concentrations that adversely affect beneficial uses;

   b. Pesticides to be present in bottom sediments or aquatic life in concentrations that adversely affect beneficial uses;

c. Total identifiable persistent chlorinated hydrocarbon pesticides to be present in the water column at concentrations detectable within the accuracy of analytical methods approved by USEPA or the Executive Officer

d. Pesticide concentrations to exceed those allowable by applicable antidegradation policies (see State Water Board Resolution No. 68-16 and 40 CFR 131.12,

e. Pesticide concentrations to exceed the lowest levels technically and economically achievable;

f. Pesticides to be present in concentration in excess of the maximum contaminant levels set forth in CCR, Title 22, division 4, chapter 15; nor

g. Thiobencarb to be present in excess of 1.0 µg/L.

10. Radioactivity:

a. Radionuclides to be present in concentrations that are harmful to human, plant, animal, or aquatic life nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

b. Radionuclides to be present in excess of the maximum contaminant levels specified in Table 4 (MCL Radioactivity) of section 64443 of Title 22 of the California Code of Regulations.

11. Suspended Sediments. The suspended sediment load and suspended sediment discharge rate of surface waters to be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

12. Settleable Substances. Substances to be present in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.

13. Suspended Material. Suspended material to be present in concentrations that cause nuisance or adversely affect beneficial uses.

14. Taste and Odors. Taste- or odor-producing substances to be present in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.

15. Temperature.

a. If the natural receiving water temperature is less than 65°F, the discharge shall not create a zone, defined by water temperature of more than 2°F above natural temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution.

b. If the natural receiving water temperature is 65°F or greater, the discharge shall not create a zone, defined by a water temperature of 1°F or more above natural receiving water temperature which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution for more than one hour per day as an average in any month.

c. The discharge shall not cause the receiving water surface temperature to increase more than 4°F above the ambient temperature of the receiving water at any time or place.

16. **Toxicity.** Toxic substances to be present, individually or in combination, in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.

17. **Turbidity.**

a. Shall not exceed 2 Nephelometric Turbidity Units (NTU) where natural turbidity is less than 1 NTU;

b. Shall not increase more than 1 NTU where natural turbidity is between 1 and 5 NTUs;

c. Shall not increase more than 20 percent where natural turbidity is between 5 and 50 NTUs;

d. Shall not increase more than 10 NTU where natural turbidity is between 50 and 100 NTUs; no

e. Shall not increase more than 10 percent where natural turbidity is greater than 100 NTUs.

B. Groundwater Limitations.

The release of waste constituents from any transport, storage, treatment, or disposal component associated with the Facility shall not cause the underlying groundwater to be degraded.

VI. Provisions

A. Standard Provisions

1. The Discharger shall comply with all (federal NPDES standard conditions from 40 CFR Part 122) Standard Provisions included in Attachment D of this Order.

2. The Discharger shall comply with the following provisions:

a. If the Discharger's wastewater treatment plant is publicly owned or subject to regulation by California Public Utilities Commission, it shall be supervised and operated by persons possessing certificates of appropriate grade according to Title 23, CCR, division 3, chapter 26.

b. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

i. Violation of any term or condition contained in this Order;

ii. Obtaining this Order by misrepresentation or by failing to disclose fully all relevant facts;

iii. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; and

iv. A material change in the character, location, or volume of discharge.

The causes for modification include:

- *New regulations.* New regulations have been promulgated under section 405(d) of the CWA, or the standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision after the permit was issued.

- *Land application plans.* When required by a permit condition to incorporate a land application plan for beneficial reuse of sewage sludge, to revise an existing land application plan, or to add a land application plan.

- *Change in sludge use or disposal practice.* Under 40 CFR 122.62(a)(1), a change in the Discharger's sludge use or disposal practice is a cause for modification of the permit. It is cause for revocation and reissuance if the Discharger requests or agrees.

The Central Valley Water Board may review and revise this Order at any time upon application of any affected person or the Central Valley Water Board's own motion.

c. If a toxic effluent standard or prohibition (including any scheduled compliance specified in such effluent standard or prohibition) is established under section 307(a) of the CWA, or amendments thereto, for a toxic pollutant that is present in the discharge authorized herein, and such standard or prohibition is more stringent than any limitation upon such pollutant in this Order, the Central Valley Water Board will revise or modify this Order in accordance with such toxic effluent standard or prohibition.

The Discharger shall comply with effluent standards and prohibitions within the time provided in the regulations that establish those standards or prohibitions, even if this Order has not yet been modified.

d. This Order shall be modified, or alternately revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the CWA, if the effluent standard or limitation so issued or approved:

i. contains different conditions or is otherwise more stringent than any effluent limitation in the Order; or

ii. controls any pollutant limited in the Order.

The Order, as modified or reissued under this paragraph, shall also contain any other requirements of the CWA then applicable.

e. The provisions of this Order are severable. If any provision of this Order is found invalid, the remainder of this Order shall not be affected.

f. The Discharger shall take all reasonable steps to minimize any adverse effects to waters of the State or users of those waters resulting from any discharge or sludge use or disposal in violation of this Order. Reasonable steps shall include such accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying discharge or sludge use or disposal, and adequate public notification to downstream water agencies or others who might contact the non-complying discharge.

g. The Discharger shall ensure compliance with any existing or future pretreatment standard promulgated by USEPA under section 307 of the CWA, or amendment thereto, for any discharge to the municipal system.

h. The discharge of any radiological, chemical or biological warfare agenct or high-level, radiological waste is prohibited.

i. A copy of this Order shall be maintained at the discharge facility and be available at all times to operating personnel. Key operating personnel shall be familiar with its content.

j. Safeguard to electric power failure:

i. The Discharger shall provide safeguards to assure that, should there be reduction, loss, or failure of electric power, the discharge shall comply with the terms and conditions of this Order.

ii. Upon written request by the Central Valley Water Board the Discharger shall submit a written description of safeguards. Such safeguards may include alternate power sources, standby generators, retention capacity, operating procedures, or other means. A description of the safeguards provided shall include an analysis of the frequency, duration, and impact of power failures experienced over the past 5 years on effluent quality and on the capability of the Discharger to comply with the terms and conditions of the Order. The adequacy of the safeguards is subject to the approval of the Central Valley Water Board.

iii. Should the treatment works not include safeguards against reduction, loss, or failure of electric power, or should the Central Valley Water Board not approve the existing safeguards, the Discharger shall, within 90 days of having been advised in writing by the Central Valley Water Board that the existing safeguards are inadequate, provide to the Central Valley Water Board and USEPA a schedule of compliance for providing safeguards such that in the event of reduction, loss, or failure of electric power, the Discharger shall comply with the terms and conditions of this Order. The schedule of compliance shall, upon approval of the Central Valley Water Board, become a condition of this Order.

k. The Discharger, upon written request of the Central Valley Water Board, shall file with the Board a technical report on its preventive (failsafe) and contingency (cleanup) plans for controlling accidental discharges, and for minimizing the effect of such events. This report may be combined with that required under Central Valley Water Board Standard Provision contained in section VI.A.2.i. of this Order.

The technical report shall:

i. Identify the possible sources of spills, leaks, untreated waste by-pass, and contaminated drainage. Loading and storage areas, power outage, waste treatment unit outage, and failure of process equipment, tanks and pipes should be considered.

ii. Evaluate the effectiveness of present facilities and procedures and state when they became operational.

iii. Predict the effectiveness of the proposed facilities and procedures and provide an implementation schedule containing interim and final dates when they will be constructed, implemented, or operational.

The Central Valley Water Board, after review of the technical report, may establish conditions which it deems necessary to control accidental discharges and to minimize the effects of such events. Such conditions shall be incorporated as part of this Order, upon notice to the Discharger.

l. A publicly owned treatment works whose waste flow has been increasing, or is projected to increase, shall estimate when flows will reach hydraulic and treatment capacities of its treatment and disposal facilities. The projections shall be made in January, based on the last 3 years' average dry weather flows, peak wet weather flows and total annual flows, as appropriate. When any projection shows that capacity of any part of the facilities may be exceeded in 4 years, the Discharger shall notify the Central Valley Water Board by 31 January. A copy of the notification shall be sent to appropriate local elected officials, local permitting agencies and the press. Within 120 days of the notification, the Discharger shall submit a technical report showing how it will prevent flow volumes from exceeding capacity or how it will increase capacity to handle the larger flows. The Central Valley Water Board may extend the time for submitting the report.

m. The Discharger shall submit technical reports as directed by the Executive Officer. All technical reports required herein that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code, sections 6735, 7835, and 7835.1. To demonstrate compliance with Title 16, CCR, sections 415 and 3065, all technical reports must contain a statement of the qualifications of the responsible registered professional(s). As required by these laws, completed technical reports must bear the signature(s) and seal(s) of the registered professional(s) in a manner such that all work can be clearly attributed to the professional responsible for the work.

n. The Central Valley Water Board is authorized to enforce the terms of this permit under several provisions of the CWC, including, but not limited to, sections 13385, 13386, and 13387.

o. For publicly owned treatment works, prior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater that results in a decrease of flow in any portion of a watercourse, the Discharger must file a petition with the State Water Board, Division of Water Rights, and receive approval for such a change. (CWC section 1211).

p. In the event the Discharger does not comply or will be unable to comply for any reason, with any prohibition, maximum daily effluent limitation, 1-hour average effluent limitation, or receiving water limitation contained in this Order, the Discharger shall notify the Central Valley Water Board by telephone (916) 464-3291 within 24 hours of having knowledge of such noncompliance, and shall confirm this notification in writing within 5 days, unless the Central Valley Water Board waives confirmation. The written notification shall include the information required by the Standard Provision contained in Attachment D section V.E.1. [40 CFR 122.41(l)(6)(i)].

q. Failure to comply with provisions or requirements of this Order, or violation of other applicable laws or regulations governing discharges from this facility, may subject the Discharger to administrative or civil liabilities, criminal penalties, and/or other enforcement remedies to ensure compliance. Additionally, certain violations may subject the Discharger to civil or criminal enforcement from appropriate local, state, or federal law enforcement entities.

r. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to the Central Valley Water Board.

To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the state of incorporation if a corporation, address and telephone number of the persons responsible for contact with the Central Valley Water Board and a statement. The statement shall comply with the signatory and certification requirements in the federal Standard Provisions (Attachment D, section V.B) and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the CWC. Transfer shall be approved or disapproved in writing by the Executive Officer.

B. Monitoring and Reporting Program Requirements

The Discharger shall comply with the Monitoring and Reporting Program, and future revisions thereto, in Attachment E of this Order.

C. Special Provisions

1. Reopener Provisions

a. Conditions that necessitate a major modification of a permit are described in 40 CFR 122.62, including:

i. If new or amended applicable water quality standards are promulgated or approved pursuant to section 303 of the CWA, or amendments thereto, this permit may be reopened and modified in accordance with the new or amended standards.

ii. When new information, that was not available at the time of permit issuance, would have justified different permit conditions at the time of issuance.

b. This Order may be reopened for modification, or revocation and reissuance, as a result of the detection of a reportable priority pollutant generated by special conditions included in this Order. These special conditions may be, but are not limited to, fish tissue sampling, whole effluent toxicity, monitoring requirements on internal waste streams, and monitoring for surrogate parameters. Additional requirements may be included in this Order as a result of the special condition monitoring data.

c. **Pollution Prevention.** This Order requires the Discharger prepare pollution prevention plans following CWC section 13263.3(d)(3) for ammonia and mercury. Based on a review of the pollution prevention plans, this Order may be reopened for addition and/or modification of effluent limitations and requirements for these constituents.

d. **Whole Effluent Toxicity.** As a result of a Toxicity Reduction Evaluation (TRE), this Order may be reopened to include a numeric chronic toxicity limitation, a new acute toxicity limitation, and/or a limitation for a specific toxicant identified in the TRE. Additionally, if the State Water Board revises the SIP's toxicity control provisions that would require the establishment of numeric chronic toxicity effluent limitations, this Order may be reopened to include a numeric chronic toxicity effluent limitation based on the new provisions.

e. **Water Effects Ratios (WER) and Metal Translators.** A default WER of 1.0 has been used in this Order for calculating CTR criteria for applicable priority pollutant inorganic constituents. In addition, default dissolved-to-total metal translators have been used to convert water quality objectives from dissolved to total recoverable when developing effluent limitations for copper. If the Discharger performs studies to determine site-specific WERs and/or site-specific dissolved-to-total metal translators, this Order may be reopened to modify the effluent limitations for the applicable inorganic constituents.

f. **Perchlorate and 1,2-diphenyl hydrazine Studies.** If after review of the study results it is determined that the discharge has reasonable potential to cause or contribute to an exceedance of a water quality objective this Order may be reopened and effluent limitations added for the subject constituents.

g. **Central Valley Drinking Water Policy**. If water quality objectives are adopted for organic carbon, nutrients, salinity, bromide, or pathogens to protect drinking water supplies in the Central Valley Region, this Order may be reopened for addition and/or modification of effluent limitations and requirements, as appropriate, to require compliance with the applicable water quality objectives.

h. **Ammonia Studies.** The ammonia effluent limitations in this Order are based on USEPA's recommended National Ambient Water Quality Criteria for protection of aquatic life. However, studies are ongoing to evaluate the effect of ammonia on the inhibition of growth of diatoms in the Bay-Delta, studies to evaluate the sensitivity of delta smelt to ammonia toxicity, and studies of the technological feasibility of ammonia removal processes. Based on the result of these studies, this Order may be reopened to modify the ammonia effluent limitations, as appropriate.

i. **Temperature Studies.** The temperature effluent limitations and receiving water prohibitions are based on the existing Thermal Plan exemption conditions. The United States Fish and Wildlife Service (USFWS) requested studies to characterize fish behavior in the affected river reach to determine how fish behave in response to the discharge field, and whether predator concentrations are elevated in the thermal discharge field. Based on the result of these studies, this Order may be reopened to modify the temperature effluent limitations and receiving water prohibitions, as appropriate.

j. **Regional Monitoring Program.** The State and Regional Water Boards are committed to creation of a coordinated Regional Monitoring Program to address receiving water monitoring in the Delta for all Water Board regulatory and research programs. When a Regional Monitoring Program becomes functional, this permit may be reopened to make appropriate adjustments in permit-specific monitoring to coordinate with the Regional Monitoring Program.

k. **The Bay-Delta Plan**. The South Delta salinity standards are currently under review by the State Water Board in accordance with implementation provisions contained in the Bay-Delta Water Quality Control Plan. If applicable water quality objectives of the Bay-Delta Plan are adopted, this Order may be reopened for addition and/or modification of effluent limitations and requirements, as appropriate.

l. **Constituents of Emerging Concern** (CECs). The State Water Resources Control Board is conducting studies on CECs discharged from wastewater treatment plants. Upon completion of the studies and formulation of recommendations for CEC monitoring, this Order may be reopened for addition of monitoring or special studies of CECs in the treatment plant discharge.

m. **Interim Ammonia Effluent Limitations.** The Discharger is required in the Pollution Prevention Program to evaluate means of reducing effluent ammonia concentrations in the interim until compliance with final Ammonia effluent limitations can be attained. If the Discharger identifies and implements strategies that reduce effluent Ammonia concentrations, this Order may be reopened for modification of the interim Ammonia Effluent Limitations.

n. **Nitrogen Studies.** The nitrate effluent limitations in this Order are based on USEPA's primary maximum contaminant level for drinking water. However, studies are on-going to evaluate the effect of nitrogen in the Bay-Delta system and to users of Bay-Delta waters. Based on the result of these or other studies, this Order may be reopened to modify the nitrate effluent limitations, as appropriate.

2. Special Studies, Technical Reports and Additional Monitoring Requirements

a. **Chronic Whole Effluent Toxicity.** For compliance with the Basin Plan's narrative toxicity objective, this Order requires the Discharger to conduct chronic whole effluent toxicity (WET) testing, as specified in the Monitoring and Reporting Program (Attachment E, section V). Furthermore, this Provision requires the Discharger to investigate the causes of, and identify corrective actions to reduce or eliminate effluent toxicity. If the discharge exhibits toxicity exceeding the numeric toxicity monitoring trigger during accelerated monitoring established in this Provision, the Discharger is required to initiate a TRE in accordance with an approved TRE Workplan, and take actions to mitigate the impact of the discharge

i. **Toxicity Reduction Evaluation (TRE) Workplan.** Within 90 days of the effective date of this Order, the Discharger shall submit to the Central Valley Water Board a TRE Workplan for approval by the Executive Officer. The TRE Workplan shall outline the procedures for identifying the source(s) of, and reducing or eliminating effluent toxicity. The TRE Workplan must be developed in accordance with USEPA guidance[1] and be of adequate detail to allow the Discharger to immediately initiate a TRE as required in this Provision.

ii. **Accelerated Monitoring and TRE Initiation.** When the numeric toxicity monitoring trigger is exceeded during regular chronic toxicity monitoring, and the testing meets all test acceptability criteria, the Discharger shall initiate accelerated monitoring as required in the Accelerated Monitoring Specifications. The Discharger shall initiate a TRE to address effluent toxicity if any WET testing results exceed the numeric toxicity monitoring trigger during accelerated monitoring.

iii. **Numeric Toxicity Monitoring Trigger.** The numeric toxicity monitoring trigger to initiate a TRE is **8 TU_C** (where TU_C = 100/NOEC). The monitoring trigger is not an effluent limitation; it is the toxicity threshold at which the Discharger is required to begin accelerated monitoring and initiate a TRE when the effluent exhibits toxicity.

iv. **Accelerated Monitoring Specifications.** If the numeric toxicity monitoring trigger is exceeded during regular chronic toxicity testing, the Discharger shall initiate accelerated monitoring within 14 days of notification by the laboratory of the exceedance. Accelerated monitoring shall consist of four (4) chronic toxicity tests conducted once every 2 weeks using the species that exhibited toxicity. The following protocol shall be used for accelerated monitoring and TRE initiation:

(a) If the results of four (4) consecutive accelerated monitoring tests do not exceed the monitoring trigger, the Discharger may cease accelerated monitoring and resume regular chronic toxicity monitoring. However, notwithstanding the accelerated monitoring results, if there is adequate

[1] See the Fact Sheet (Attachment F, section VII.B.2.a. for a list of USEPA guidance documents that must be considered in the development of the TRE Workplan.)

evidence of effluent toxicity, the Executive Officer may require that the Discharger initiate a TRE.

(b) If the source(s) of the toxicity is easily identified (e.g., temporary plant upset), the Discharger shall make necessary corrections to the facility and shall continue accelerated monitoring until four (4) consecutive accelerated tests do not exceed the monitoring trigger. Upon confirmation that the effluent toxicity has been removed, the Discharger may cease accelerated monitoring and resume regular chronic toxicity monitoring.

(c) If the result of any accelerated toxicity test exceeds the monitoring trigger, the Discharger shall cease accelerated monitoring and begin a TRE to investigate the cause(s) of, and identify corrective actions to reduce or eliminate effluent toxicity. Within thirty (30) days of notification by the laboratory of any test result exceeding the monitoring trigger during accelerated monitoring, the Discharger shall submit a TRE Action Plan to the Central Valley Water Board including, at minimum:

(1) Specific actions the Discharger will take to investigate and identify the cause(s) of toxicity, including a TRE WET monitoring schedule;

(2) Specific actions the Discharger will take to mitigate the impact of the discharge and prevent the recurrence of toxicity; and

(3) A schedule for these actions.

b. Perchlorate and 1,2-Diphenyl-hydrazine Study. There are indications that the discharge may contain perchlorate and 1,2-Diphenyl-hydrazine at levels that may have a reasonable potential to cause or contribute to an exceedance of water quality objectives. The Discharger shall comply with the following time schedule to conduct a study to determine if the effluent has the reasonable potential to cause or contribute to an instream exceedance of the applicable water quality objective for perchlorate and 1,2-Diphenyl-hydrazine:

Task	Compliance Date
i. Submit Workplan and Time Schedule	90 days from Adoption Date of this Order
ii. Begin Study	To be determined in Task i.
iii. Complete Study	To be determined in Task i.
iv. Submit Study Report	To be determined in Task I, or by three years from the Adoption Date of this Order, whichever is sooner.

c. *Hyalella azteca* Study. The Discharger shall submit a workplan and time schedule for Executive Officer approval to conduct a study to determine if it is feasible to use existing laboratory procedures to evaluate both acute and chronic toxicity of the discharge. The study should build upon existing research of whole effluent toxicity (WET) testing using *Hyalella azteca* and shall recommend monitoring frequencies that result in an effective evaluation of the discharge (e.g., monitoring conducted when pyrethroid pesticides may be prevalent in the discharge). The permit may be reopened to incorporate the testing if determined feasible.

Task	Compliance Date
i. Submit Workplan and Time Schedule	90 days from Adoption Date of this Order
ii. Begin Study	To be determined in Task i.
iii. Complete Study	To be determined in Task i.
iv. Submit Study Report	To be determined in Task i.

d. Temperature Study. The Discharger shall submit a workplan and time schedule for Executive Officer approval for determining whether permitted conditions are protective of the aquatic life beneficial uses of the Sacramento River. The workplan shall be implemented upon approval by the Executive Officer. The study will include an evaluation of: (1) the existing Thermal Plan Exception and its effects on aquatic life, and (2) any proposed request for new Thermal Plan Exception(s). The Discharger must consult with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Game, to consider additional issues (such a fish attractively to mixing zone areas) in development of the workplan for the Study.

Task	Compliance Date
i. Submit Workplan and Time Schedule	180 days from the Adoption Date of this Order
ii. Begin Study	To be determined in Task i.
iii. Complete Study	To be determined in Task i.
iv. Submit Study Report	To be determined in Task or by four years from the Adoption Date of this Order, whichever is sooner.

3. **Best Management Practices and Pollution Prevention**

a. **Pollution Prevention Plan for mercury.** Mercury concentrations in the SRWTP effluent have been reduced by implementation of the Discharger's 2001 Pollution Prevention Plan. The Discharger shall update and continue to implement its Pollution Prevention Plan for mercury, in accordance with CWC section 13263.3. The minimum requirements for the Pollution Prevention Plan are outlined in the Fact Sheet (Attachment F section VII.B.7.b). The Pollution Prevention Plan for mercury shall be updated and submitted to the Central Valley Water Board

within nine months of the adoption date of this Order for the approval by the Executive Officer. The Discharger shall submit annual reports evaluating the effectiveness of the plan in accordance with the Monitoring and Reporting Program (Attachment E section X.D.1.)

b. **Salinity Evaluation and Minimization Plan.** The Discharger shall prepare a salinity evaluation and minimization plan to address sources of salinity from the Facility. The plan shall be completed and submitted to the Central Valley Water Board **within nine months of the adoption date of this Order** for the approval by the Executive Officer. The plan shall be implemented upon approval by the Executive Officer. The Discharger shall submit an annual report evaluating the effectiveness of the plan in accordance with the Monitoring and Reporting Program (Attachment E section X.D.1.).

c. **2,3,7,8-TCDD and Other Dioxin and Furan Congeners Source Evaluation and Minimization Plan.** The Discharger shall prepare a 2,3,7,8-TCDD and other dioxin and furan congeners evaluation and minimization plan to address sources of detectable dioxins OCDD and 1,2,3,6,7,8-HpCDD from the Facility. The plan shall be completed and submitted to the Central Valley Water Board **within nine months of the adoption date of this Order** for review and approval by the Executive Officer.

4. **Construction, Operation and Maintenance Specifications**

   a. **Turbidity.** Effective **1 December 2020** or upon compliance with Special Provisions VI.C.6.a, whichever is sooner, effluent turbidity shall not exceed:

      i. 2 NTU, as a daily average;

      ii. 5 NTU, more than 5% of the time within a 24-hour period; and

      iii. 10 NTU, at any time.

   b. The treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

   c. **Emergency Storage Basin Operating Requirements.**

      i. The treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

      ii. Public contact with wastewater shall be precluded through such means as fences, signs, and other acceptable alternatives.

      iii. Ponds shall be managed to prevent breeding of mosquitoes. In particular,

a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.

b. Weeds shall be minimized.

c. Dead algae, vegetation, and debris shall not accumulate on the water surface.

iv. Freeboard for the total ESB system shall never be less than 2 feet (measured vertically to the lowest point of overflow).

v. The discharge of waste classified as "hazardous" as defined in section 2521(a) of Title 23, California Code of Regulations (CCR), or "designated", as defined in section 13173 of the CWC, to the treatment ponds is prohibited.

vi. Objectionable odors originating at this Facility shall not be perceivable beyond the limits of the wastewater treatment and disposal areas (or property owned by the Discharger).

5. Special Provisions for Municipal Facilities (POTWs Only)

a. Collection System. On 2 May 2006, the State Water Board adopted State Water Board Order No. 2006-0003, a Statewide General WDR for Sanitary Sewer Systems. The Discharger shall be subject to the requirements of Order No. 2006-0003 and any future revisions thereto. Order No. 2006-0003 requires that all public agencies that currently own or operate sanitary sewer systems apply for coverage under the General WDR. The Discharger has applied for and has been approved for coverage under State Water Board Order 2006-0003 for operation of its wastewater collection system.

b. Pretreatment Requirements.

i. The Discharger shall be responsible and liable for the performance of all Control Authority pretreatment requirements contained in 40 CFR Part 403, including any subsequent regulatory revisions to 40 CFR Part 403. Where 40 CFR Part 403 or subsequent revision places mandatory actions upon the Discharger as Control Authority but does not specify a timetable for completion of the actions, the Discharger shall complete the required actions within 6 months from the issuance date of this permit or the effective date of the 40 CFR Part 403 revisions, whichever comes later. For violations of pretreatment requirements, the Discharger shall be subject to enforcement actions, penalties, fines, and other remedies by USEPA or other appropriate parties, as provided in the CWA.

ii. The Discharger shall enforce the requirements promulgated under sections 307(b), 307(c), and 307(d), and 402(b) of the CWA with timely, appropriate and effective enforcement actions. The Discharger shall cause all nondomestic users subject to federal categorical standards to achieve compliance no later than the date specified in those requirements or, in the case of a new nondomestic user, upon commencement of the discharge.

iii. The Discharger shall perform the pretreatment functions as required by in 40 CFR Part 403 including, but not limited to:

(a) Implement the necessary legal authorities required as provided in 40 CFR 403.8(f)(1);

(b) Enforce the pretreatment requirements under 40 CFR 403.5 and 403.6;

(c) Implement the programmatic functions as provided in 40 CFR 403.8(f)(2); and

(d) Provide the requisite funding and personnel to implement the pretreatment program as provided in 40 CFR 403.8(f)(3).

iv. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, the necessary legal authorities, programs, and controls to ensure that the following incompatible wastes are not introduced to the treatment system, where incompatible wastes are:

(a) Wastes which create a fire or explosion hazard in the treatment works;

(b) Wastes which will cause corrosive structural damage to treatment works, but in no case wastes with a pH lower than 5.0, unless the works is specially designed to accommodate such wastes;

(c) Solid or viscous wastes in amounts which cause obstruction to flow in sewers, or which cause other interference with proper operation or treatment works;

(d) Any waste, including oxygen demanding pollutants (BOD, etc.), released in such volume or strength as to cause inhibition or disruption in the treatment works, and subsequent treatment process upset and loss of treatment efficiency;

(e) Heat in amounts that inhibit or disrupt biological activity in the treatment works, or that raise influent temperatures above 40°C (104°F), unless the Regional Water Board approves alternate temperature limits;

(f) Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

(g) Pollutants which result in the presence of toxic gases, vapors, or fumes within the treatment works in a quantity that may cause acute worker health and safety problems; and:

(h) Any trucked or hauled pollutants, except at points predesignated by the Discharger.

v. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, the legal authorities, programs, and controls necessary to ensure that indirect discharges do not introduce pollutants into the sewerage system that, either alone or in conjunction with a discharge or discharges from other sources:

(a) Flow through the system to the receiving water in quantities or concentrations that cause a violation of this Order, or:

(b) Inhibit or disrupt treatment processes, treatment system operations, or sludge processes, use, or disposal and either cause a violation of this Order or prevent sludge use or disposal in accordance with this Order.

6. Other Special Provisions

a. Effective 1 December 2020, wastewater shall be oxidized, coagulated, filtered, and adequately disinfected pursuant to the Department of Public Health (DPH) reclamation criteria, CCR, Title 22, division 4, chapter 3, (Title 22), or equivalent, in accordance with the compliance schedule in Section VI.C.7.a, below.

7. Compliance Schedules

a. Compliance Schedule for Title 22, or Equivalent, Disinfection Requirements. By **1 December 2020**, wastewater discharged to the Sacramento River shall be oxidized, coagulated, filtered, and adequately disinfected pursuant to the Department of Public Health (DPH) reclamation criteria, Title 22 CCR, Division 4, Chapter 3, (Title 22), or equivalent. This Order also requires compliance with the final effluent limitations for BOD_5, total coliform organisms, and TSS by **1 December 2020**. Until final compliance, the Discharger shall submit progress reports in accordance with the Monitoring and Reporting Program (Attachment E, section X.D.1).

Task	Date Due
i. Submit Method of Compliance Workplan/Schedule	Within 6 months after adoption of this Order
ii. Progress Reports[1]	**1 February**, annually, after approval of work plan until final compliance
iii. Begin CEQA process for Compliance Project	Within 4 years after Adoption Date of this Order
iv. Begin construction of Compliance Project	Within 7 years after Adoption Date of

Task	Date Due
	this Order
v. Full Compliance	**1 December 2020**

[1] The progress reports shall detail what steps have been implemented towards achieving compliance with waste discharge requirements, including studies, construction progress, evaluation of measures implemented, and recommendations for additional measures as necessary to achieve full compliance by the final compliance date.

b. Compliance Schedule for Final Effluent Limitations for ammonia. This Order requires compliance with the final effluent limitations for ammonia by **1 December 2020**. The Discharger shall comply with the following time schedule to ensure compliance with the final effluent limitations:

Task	Date Due
i. Submit Method of Compliance Workplan/Schedule	Within 6 months after adoption of this Order
ii. Submit and Implement Pollution Prevention Plan (PPP)[1] for ammonia	Within 1 year after adoption of this Order
iii. Progress Reports[2]	1 **February**, annually, after approval of work plan until final compliance
iv. Begin CEQA process for Compliance Project	Within 4 years after Adoption Date of this Order
v. Begin construction of Compliance Project	Within 7 years after Adoption Date of this Order
vi. Full Compliance	**1 December 2020**

[1] The PPP shall be prepared and implemented in accordance with CWC section 13263.3(d)(3) as outlined in the Fact Sheet (Attachment F section VII.C.7.b). The PPP shall include an evaluation of methods for reducing effluent ammonia concentrations through treatment process optimization, eliminating high ammonia side streams, etc.

[2] The progress reports shall detail what steps have been implemented towards achieving compliance with waste discharge requirements, including studies, construction progress, evaluation of measures implemented, and recommendations for additional measures as necessary to achieve full compliance by the final compliance date.

VII. COMPLIANCE DETERMINATION

A. BOD_5 and TSS Effluent Limitations (Section IV.A.1.a. and 2.a.). Compliance with the final and interim effluent limitations for BOD_5 and TSS required in Limitations and Discharge Requirements section IV.A.1.a. and 2.a. shall be ascertained by 24-hour composite samples. Compliance with effluent limitations required in Limitations and Discharge Requirements section IV.A.1.b for percent removal shall be calculated using the arithmetic mean of BOD_5 and TSS in effluent samples collected over a monthly period as a percentage of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period.

B. Aluminum Effluent Limitations (Section IV.A.1.i). Compliance with the final effluent limitations for aluminum can be demonstrated using either total or acid-soluble (inductively coupled plasma/atomic emission spectrometry or inductively coupled plasma/mass spectrometry) analysis methods, as supported by USEPA's Ambient Water Quality Criteria for Aluminum document (EPA 440/5-86-008), or other standard methods that exclude aluminum silicate particles as approved by the Executive Officer.

C. Total Mercury Mass Loading Effluent Limitations (Section IV.A.1.k). The procedures for calculating mass loadings are as follows:

1. The total pollutant mass load for each individual calendar month shall be determined using an average of all concentration data collected that month and the corresponding total monthly flow. All effluent monitoring data collected under the monitoring and reporting program, pretreatment program and any special studies shall be used for these calculations. The total calendar annual mass loading shall be the sum of the individual calendar months from January through December.

2. In calculating compliance, the Discharger shall count all non-detect measures at one-half of the detection level. If compliance with the effluent limitation is not attained due to the non-detect contribution, the Discharger shall improve and implement available analytical capabilities and compliance shall be evaluated with consideration of the detection limits.

D. Average Dry Weather Flow Effluent Limitations (Section IV.A.1.h). Compliance with the average dry weather flow effluent limitations will be determined annually based on the average daily flow over the three lowest consecutive dry weather months (e.g., July, August, and September).

E. Total Coliform Organisms Final and Interim Effluent Limitations (Section IV.A.1.g. and 2.c.). For each day that an effluent sample is collected and analyzed for total coliform organisms, compliance with the 7-day median final effluent limitation shall be determined by calculating the median concentration of total coliform bacteria in the effluent utilizing the bacteriological results of the last 7 days. For example, if a sample is collected on a Wednesday, the result from that sampling event and all results from the previous 6 days (i.e., Tuesday, Monday, Sunday, Saturday, Friday, and Thursday) are used to calculate the 7-day median..

Compliance with the interim weekly median effluent limitation shall be determined by taking the median value of all samples collected from Sunday through Saturday of each calendar week.

F. Total Residual Chlorine Effluent Limitations (Section IV.A.1.f. and 2.b.). Continuous monitoring analyzers for chlorine residual or for dechlorination agent residual in the effluent are appropriate methods for compliance determination. A positive residual dechlorination agent in the effluent indicates that chlorine is not present in the discharge, which demonstrates compliance with the effluent limitations. This type of monitoring can also be used to prove that some chlorine residual exceedances are false positives. Continuous monitoring data showing either a positive dechlorination agent residual or a chlorine residual at or below the prescribed limit are sufficient to show compliance with the total residual chlorine effluent limitations, as long as the instruments are maintained and calibrated in accordance with the manufacturer's recommendations.

Any excursion above the 1-hour average or 4-day average total residual chlorine effluent limitations is a violation. If the Discharger conducts continuous monitoring and the Discharger can demonstrate, through data collected from a back-up monitoring system, that a chlorine spike recorded by the continuous monitor was not actually due to chlorine, then any excursion resulting from the recorded spike will not be considered an exceedance, but rather reported as a false positive. Records supporting validation of false positives shall be maintained in accordance with Section IV Standard Provisions (Attachment D).

G. **Chronic Whole Effluent Toxicity Effluent Limitation (Section IV.A.1.c).** Compliance with the accelerated monitoring and TRE/TIE provisions of Provision VI.C.2.a shall constitute compliance with the effluent limitation.

H. **Acute Whole Effluent Toxicity Effluent Limitation (Section IV.A.1.d).** For each 96-hour acute bioassay test result, compliance with the acute WET 90% median survival effluent limitation shall be determined based on the median of that test result and the previous two test results.

I. **Turbidity Receiving Water Limitation (Section V.A.17.).** Compliance shall be determined using data samples from receiving water monitoring station location RSWD-003 and analyzed with data samples for natural turbidity at receiving water monitoring station location RSWU-001.

J. **Chlorpyrifos and Diazinon Effluent Limitations (Section IV.A.1.l.).** Compliance shall be determined by calculating the sum (S), as provided in this Order, with analytical results that are reported as "non-detectable" concentrations to be considered to be zero.

K. **Mass Effluent Limitations (Section IV.A.1.a).** The mass effluent limitations contained in Final Effluent Limitations IV.A.1.a and Interim Effluent Limitations IV.A.2.a and d are based on the permitted average dry weather flow and calculated as follows:

Mass (lbs/day) = Flow (MGD) x Concentration (mg/L) x 8.34 (conversion factor)

If the effluent flow exceeds the permitted average dry weather flow during wet-weather seasons, the effluent mass limitations contained in Final Effluent Limitations IV.A.1.a and Interim Effluent Limitations IV.A.2.a and d shall not apply. If the effluent flow is below the permitted average dry weather flow during wet-weather seasons, the effluent mass limitations do apply.

ATTACHMENT A – DEFINITIONS

Arithmetic Mean (μ)
Also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

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.

Average Weekly Effluent Limitation (AWEL)
The highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative
Those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic
Pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (CV)
CV is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge
Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of 1 day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

Diatoms
Diatoms are planktonic micro algae.

Detected, but Not Quantified (DNQ)
DNQ are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Dilution Credit
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.

Effluent Concentration Allowance (ECA)
ECA is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as waste load allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays
Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration
The estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Estuaries
Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in CWC section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters
All surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation
The highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation
The lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Larval Fish
Larval Fish are early life stage in the life of fish.

LC_{50}
LC_{50} is the concentration of effluent that is lethal to 50% of the exposed test organisms (measured in a dilution series ranging from 100% effluent to 0% effluent).

LOEC
LOEC is the Lowest Observed Effect Concentration (the Lowest concentration of an effluent at which adverse effects are observed on the aquatic test organism).

Maximum Daily Effluent Limitation (MDEL)
The highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median
The middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL)
MDL is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in 40 CFR Part 136, Attachment B, revised as of 3 July 1999.

Minimum Level (ML)
ML is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone
Mixing Zone is a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

NOEC
NOEC is the No Observed Effect Concentration (the highest concentration of an effluent at which no adverse effects are observed on the aquatic test organism).

Not Detected (ND)
Sample results which are less than the laboratory's MDL.

Ocean Waters
The territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Pelagic Zone
Pelagic Zone is a zone of the ocean with plants or animals living or growing at or near the surface of the ocean. Pelagic organisms may be found in the brackish water (water that is a combination of salt and fresh water) of deltas and estuaries.

Persistent Pollutants
Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Primary Production
Primary production is the production of organic compounds from atmospheric or aquatic carbon dioxide, principally through the process of photosynthesis. The organisms responsible for primary production are known as primary producers and form the base of the food chain. In aquatic systems, algae are primary producers.

Pollutant Minimization Program (PMP)
PMP means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of a priority pollutant(s) through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Central Valley Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to CWC section 13263.3(d), shall be considered to fulfill the PMP requirements.

Pollution Prevention
Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not

limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Central Valley Water Board.

Reporting Level (RL)
RL is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Central Valley Water Board either from Appendix 4 of the SIP in accordance with section 2.4.2 of the SIP or established in accordance with section 2.4.3 of the SIP. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Satellite Collection System
The portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

Source of Drinking Water
Any water designated as municipal or domestic supply (MUN) in a Central Valley Water Board Basin Plan.

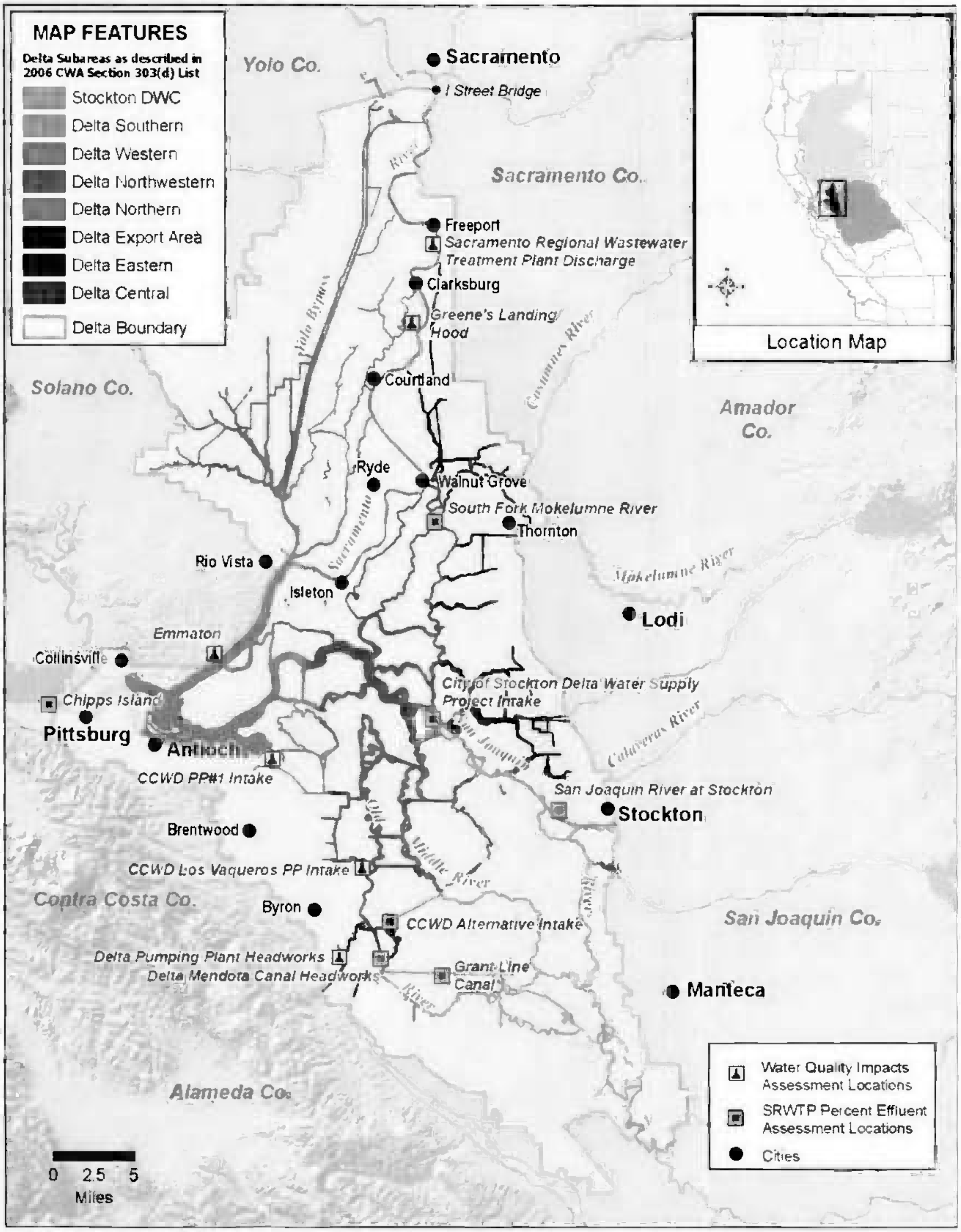
Standard Deviation (σ)
Standard Deviation is a measure of variability that is calculated as follows:

$$\sigma = (\Sigma[(x - \mu)^2]/(n - 1))^{0.5}$$

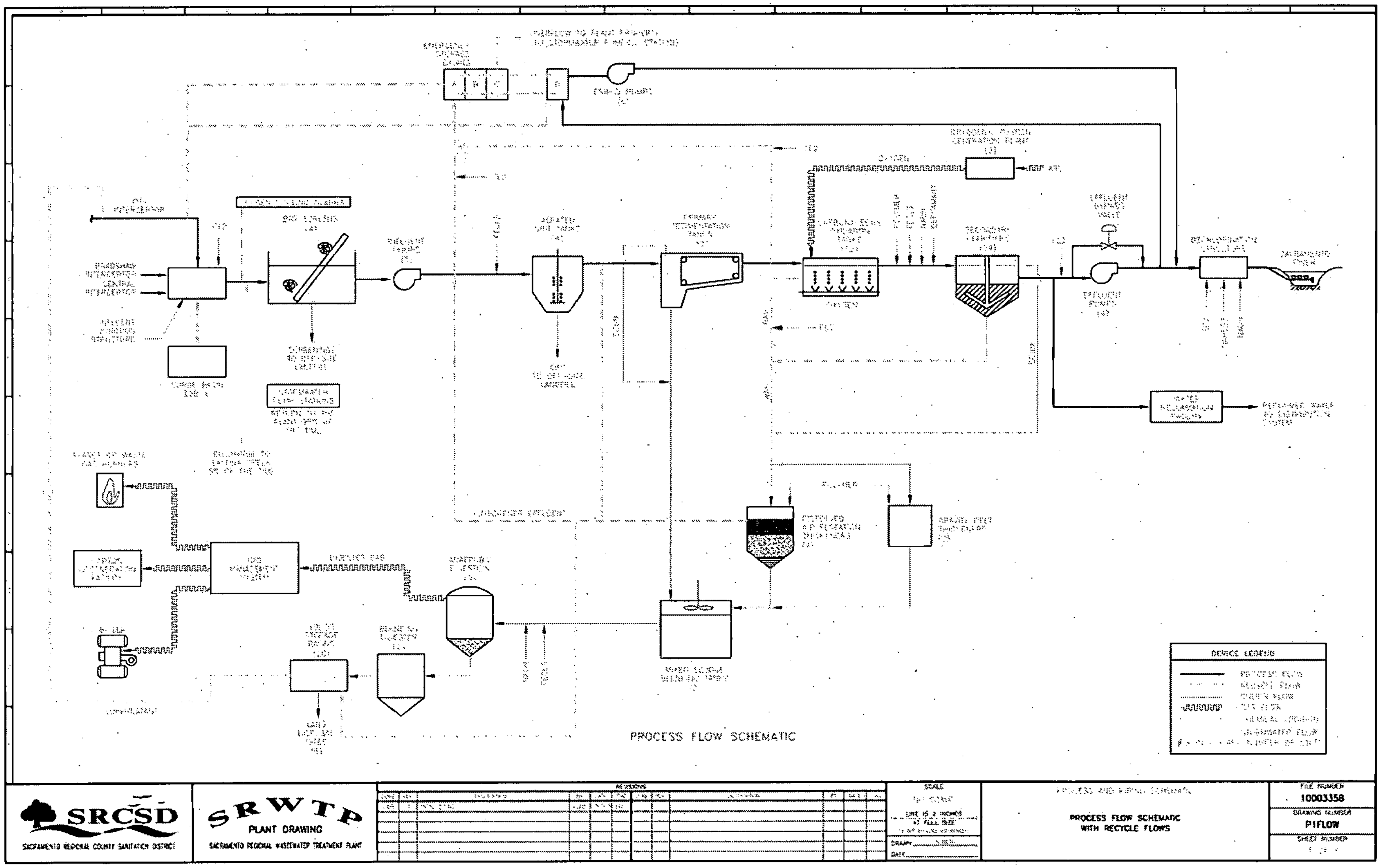
where:
x is the observed value;
μ is the arithmetic mean of the observed values; and
n is the number of samples.

Toxicity Reduction Evaluation (TRE)
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. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

ATTACHMENT B – MAP



ATTACHMENT C – FLOW SCHEMATIC



ATTACHMENT D – STANDARD PROVISIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 CFR 122.41(a).)

2. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 CFR 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 CFR 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 CFR 122.41(e).)

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 CFR 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 CFR 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Central Valley Water Board, State Water Board, United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (40 CFR 122.41(i); CWC section 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 CFR 122.41(i)(1));
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 CFR 122.41(i)(2));
3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 CFR 122.41(i)(3)); and
4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location. (40 CFR 122.41(i)(4).)

G. Bypass

1. Definitions

   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR 122.41(m)(1)(i).)

   b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR 122.41(m)(1)(ii).)

2. Bypass not exceeding limitations. The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3, I.G.4, and I.G.5 below. (40 CFR 122.41(m)(2).)

3. Prohibition of bypass. Bypass is prohibited, and the Central Valley Water Board may take enforcement action against a Discharger for bypass, unless (40 CFR 122.41(m)(4)(i)):

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 CFR 122.41(m)(4)(i)(A));

   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 CFR 122.41(m)(4)(i)(B)); and

   c. The Discharger submitted notice to the Central Valley Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 CFR 122.41(m)(4)(i)(C).)

4. The Central Valley Water Board may approve an anticipated bypass, after considering its adverse effects, if the Central Valley Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above. (40 CFR 122.41(m)(4)(ii).)

5. Notice

   a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass. (40 CFR 122.41(m)(3)(i).)

   b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 CFR 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 CFR 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that

noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 CFR 122.41(n)(2).)

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 CFR 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 CFR 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 CFR 122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 CFR 122.41(n)(3)(iii)); and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 CFR 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 CFR 122.41(n)(4).)

2. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 CFR 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 CFR 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Central Valley Water Board. The Central Valley Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the CWC. (40 CFR 122.41(l)(3) and 122.61.)

3. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 CFR 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503 unless other test procedures have been specified in this Order. (40 CFR 122.41(j)(4) and 122.44(i)(1)(iv).)

4. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least 5 years (or longer as required by 40 CFR Part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Central Valley Water Board Executive Officer at any time. (40 CFR 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 CFR 122.41(j)(3)(i));
2. The individual(s) who performed the sampling or measurements (40 CFR 122.41(j)(3)(ii));
3. The date(s) analyses were performed (40 CFR 122.41(j)(3)(iii));
4. The individual(s) who performed the analyses (40 CFR 122.41(j)(3)(iv));
5. The analytical techniques or methods used (40 CFR 122.41(j)(3)(v)); and
6. The results of such analyses. (40 CFR 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 CFR 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 CFR 122.7(b)(1)); and
2. Permit applications and attachments, permits and effluent data. (40 CFR 122.7(b)(2).)

5. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Central Valley Water Board, State Water Board, or USEPA within a reasonable time, any information which the Central Valley Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Central Valley Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 CFR 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Central Valley Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below. (40 CFR 122.41(k).)

2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA). (40 CFR 122.22(a)(3).).

3. All reports required by this Order and other information requested by the Central Valley Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 CFR 122.22(b)(1));

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 CFR 122.22(b)(2)); and

   c. The written authorization is submitted to the Central Valley Water Board and State Water Board. (40 CFR 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Central Valley Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 CFR 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification:

   "*I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*" (40 CFR 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 CFR 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Central Valley Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. (40 CFR 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Central Valley Water Board. (40 CFR 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 CFR 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be

submitted no later than 14 days following each schedule date.
(40 CFR 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
(40 CFR 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 CFR 122.41(l)(6)(ii)):

    a. Any unanticipated bypass that exceeds any effluent limitation in this Order.
    (40 CFR 122.41(l)(6)(ii)(A).)

    b. Any upset that exceeds any effluent limitation in this Order.
    (40 CFR 122.41(l)(6)(ii)(B).)

3. The Central Valley Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 CFR 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Central Valley Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 CFR 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b)
(40 CFR 122.41(l)(1)(i)); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 CFR 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not

reported during the permit application process or not reported pursuant to an approved land application plan. (40 CFR 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Central Valley Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements. (40 CFR 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. (40 CFR 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Central Valley Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 CFR 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Central Valley Water Board is authorized to enforce the terms of this permit under several provisions of the CWC, including, but not limited to, sections 13385, 13386, and 13387

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Publicly-Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Central Valley Water Board of the following (40 CFR 122.42(b)):

1. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to sections 301 or 306 of the CWA if it were directly discharging those pollutants (40 CFR 122.42(b)(1)); and

2. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of the Order. (40 CFR 122.42(b)(2).)

3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 CFR 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Title 40 of the Code of Federal Regulations (CFR), section 122.48 (40 CFR 122.48) requires that all NPDES permits specify monitoring and reporting requirements. California Water Code (CWC) sections 13267 and 13383 also authorize the Central Valley Regional Water Quality Control Board (Central Valley Water Board) to require technical and monitoring reports. This Monitoring and Reporting Program establishes monitoring and reporting requirements, which implement the federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring locations specified below and, unless otherwise specified, before the monitored flow joins or is diluted by any other waste stream, body of water, or substance. Monitoring locations shall not be changed without notification to and the approval of this Central Valley Water Board.

B. Effluent samples shall be taken downstream of the last addition of wastes to the treatment or discharge works where a representative sample may be obtained prior to mixing with the receiving waters. Samples shall be collected at such a point and in such a manner to ensure a representative sample of the discharge.

C. Chemical, bacteriological, and bioassay analyses of any material required by this Order shall be conducted by a laboratory certified for such analyses by the Department of Public Health (DPH; formerly the Department of Health Services). Laboratories that perform sample analyses must be identified in all monitoring reports submitted to the Central Valley Water Board. In the event a certified laboratory is not available to the Discharger for any onsite field measurements such as pH, turbidity, temperature and residual chlorine, such analyses performed by a noncertified laboratory will be accepted provided a Quality Assurance-Quality Control Program is instituted by the laboratory. A manual containing the steps followed in this program for any onsite field measurements such as pH, turbidity, temperature and residual chlorine must be kept onsite in the treatment facility laboratory and shall be available for inspection by Central Valley Water Board staff. The Quality Assurance-Quality Control Program must conform to USEPA guidelines or to procedures approved by the Central Valley Water Board.

D. All chemical, bacteriological and bioassay analyses of any material required by this Order shall be performed in a laboratory certified to perform such analyses by DPH. Laboratories that perform sample analyses must be identified in all monitoring reports submitted to the Central Valley Water Board. The Discharger shall institute a Quality Assurance-Quality Control Program for any onsite field measurements such as pH, turbidity, temperature and residual chlorine. A manual containing the steps followed in this program must be kept onsite and shall be available for inspection by Central Valley Water Board staff. The Discharger must demonstrate sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform these field measurements. The Quality Assurance-Quality Control

Program must conform to USEPA guidelines or to procedures approved by the Central Valley Water Board.

E. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. All monitoring instruments and devices used by the Discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary, at least yearly, to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year to ensure continued accuracy of the devices.

F. Monitoring results, including noncompliance, shall be reported at intervals and in a manner specified in this Monitoring and Reporting Program.

G. Laboratories analyzing monitoring samples shall be certified by DPH, in accordance with the provision of CWC section 13176, and must include quality assurance/quality control data with their reports.

H. The Discharger shall conduct analysis on any sample provided by USEPA as part of the Discharge Monitoring Quality Assurance (DMQA) program. The results of any such analysis shall be submitted to USEPA's DMQA manager.

I. The Discharger shall file with the Central Valley Water Board technical reports on self-monitoring performed according to the detailed specifications contained in this Monitoring and Reporting Program.

J. The results of all monitoring required by this Order shall be reported to the Central Valley Water Board, and shall be submitted in such a format as to allow direct comparison with the limitations and requirements of this Order. Unless otherwise specified, discharge flows shall be reported in terms of the monthly average and the daily maximum discharge flows.

II. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order:

Table E-1. Monitoring Station Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description
--	INF-001	Location where a representative sample of the facility's influent can be obtained.
--	CAP-001	Groundwater Corrective Action Program (CAP) Discharge Monitoring
001	EFF-001	Location where a representative sample of the facility's effluent can be obtained. [Latitude 38° 27' 15"N and Longitude 121° 30' 00"W]
--	ESB (A-E)	Emergency Storage Basins A through E
--	RSWU-001	Sacramento River at Freeport Bridge
--	RSWD-003	Sacramento River 4200 feet downstream of Discharge Point No. 001 at Cliff's Marina
--	RSWD-004	Sacramento River at River Mile 44
--	RSWD-005	Sacramento River at River Mile 43
--	SPL-001	Municipal Water Supply

III. INFLUENT MONITORING REQUIREMENTS

A. Monitoring Location INF-001

1. The Discharger shall monitor influent to the facility at INF-001 as follows:

Table E-2a. Influent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	mgd	Meter	Continuous	--
Biochemical Oxygen Demand (BOD) (5-day @ 20 Deg. C)	mg/L	24-hr Composite[1]	1/day	--
Total Suspended Solids (TSS)	mg/L	24-hr Composite[1]	1/day	--
pH	Standard Units	Meter	Continuous	--
Electrical Conductivity	µmhos/cm @ 25°C	24-hr Composite[1]	1/week	--
Total Dissolved Solids	mg/L	24-hour Composite[1]	1/month	--

[1] 24-hour flow proportional composite.

B. Monitoring Location CAP-001

1. The Discharger shall monitor the Groundwater Corrective Action Program (CAP) discharge to the facility at CAP-001 as follows in Table E-2b. The monitoring results may be submitted separate from the Self-Monitoring Reports. The monitoring results collected between 1 January and 30 June shall be submitted by 31 July each year, and results collected between 1 July and 31 December shall be submitted on 1 February each year.

Table E-2b. Groundwater Corrective Action Program (CAP) Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	mgd	Meter/Totalizer	1/month	--
Title 22 Metals[1]	µg/L	Grab	2/year	--
Nitrate Nitrogen, Total (as N)	mg/L	Grab	2/year	--
Electrical Conductivity	µmhos/cm @ 25°C	Grab	2/year	--
Total Dissolved Solids	mg/L	Grab	2/year	--

1 Title 22 metals shall include the analyses of arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc.

IV. EFFLUENT MONITORING REQUIREMENTS

A. Monitoring Location EFF-001

1. The Discharger shall monitor final dechlorinated effluent at EFF-001 as follows. If more than one analytical test method is listed for a given parameter, the Discharger must select from the listed methods and corresponding Minimum Level:

Table E-3a. Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	mgd	Meter	Continuous	--
Chlorine, Total Residual[1]	mg/L	Meter	Continuous	--
Sulphur Dioxide or Sodium Bisulfite	mg/L	Meter	Continuous	--
Temperature	°F	Meter	Continuous	--
Turbidity[13]	NTU	Meter	Continuous	--
pH[3]	standard units	Meter	Continuous	--
Biochemical Oxygen Demand (5-day @ 20 °C) (BOD_5)	mg/L	24-hr Composite[6]	1/day	--
Total Suspended Solids (TSS)	mg/L	24-hr Composite[6]	1/day	--
Total Coliform	MPN/100 mL	Grab	1/day	--

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Organisms				
Ammonia Nitrogen, Total (as N)[2]	mg/L	Grab[14]	1/day	--
Settleable Solids	mL/L	24-hr Composite[6]	1/day	--
Dissolved Oxygen	mg/L	Meter	Continuous	--
Cryptosporidium	Oocysts /100 mL	Grab	1/month	EPA method 1622/23
Giardia	Cysts/ 100 mL	Grab	1/month	EPA method 1623
Nitrate Nitrogen, Total (as N)[4]	mg/L	Grab[14]	1/week	--
Nitrite Nitrogen, Total (as N)[4]	mg/L	Grab[14]	1/week	--
Total Kjeldahl Nitrogen	mg/L	24-hr Composite[6]	1/week	--
Oil and Grease	mg/L	Grab	1/month	--
Electrical Conductivity @ 25 Deg. C	µmhos/cm	24-hr Composite[6]	1/week	--
Total Dissolved Solids (TDS)	mg/L	24-hr Composite[6]	1/week	--
Total Organic Carbon	mg/L	24-hr Composite[6]	1/month	--
Aluminum, Total Recoverable[11]	µg/L	24-hr Composite[6,7]	1/month	--
Cyanide, Total Recoverable[4]	µg/L	Grab	1/month	8
Mercury, Total	ng/L	Grab	1/month	EPA Method 1631[5]
Mercury, Methyl	ng/L	Grab	1/month	EPA Method 1630[5]
Manganese, Dissolved and Total Recoverable[4]	µg/L	24-hr Composite[6]	1/month	--
Copper, Dissolved and Total Recoverable	µg/L	24-hr Composite[6,7]	1/month	--
Methylene Chloride[4]	µg/L	Grab	1/month	--
Tetrachloroethylene[4]	µg/L	Grab	1/month	--
Pentachlorophenol[4]	µg/L	Grab	1/month	EPA method 625 w/ MDL 0.05 µg/L
Dibenzo(a,h)anthracene[4]	µg/L	Grab	1/month	EPA method 625 w/MDL 0.001-0.005 µg/L
N-nitrosodimethylamine	ng/L	Grab	1/month	EPA Method 521
Bis-2 (ethylhexyl) phthalate[4,10]	µg/L	Grab	1/month	--
Chlorodibromomethane[4]	µg/L	Grab	1/month	--
Dichlorobromomethane[4]	µg/L	Grab	1/month	--
Carbon Tetrachloride[4]	µg/L	Grab	1/month	--
Methyl-tert-butyl ether (MTBE)[4]	µg/L	Grab	1/month	--
Chlorpyrifos	µg/L	24-hr Composite[6]	1/month	EPA Method 625M;

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
				Method 8141 or equivalent
Diazinon	µg/L	24-hr Composite[6]	1/month	EPA Method 625M; Method 8141 or equivalent
Hardness (as $CaCO_3$)	mg/L	24-hr Composite[6]	1/month	--
Alkalinity	mg/L	24-hr Composite[6]	1/month	--
Effluent/River Dilution Ratio[12]	--	Calculation	Continuous	--
Effluent Diversions[9]	Hr:Min	Narrative description for reason of diversion--	1/month	--

1 Beginning 1 December 2011, total chlorine residual must be monitored with a method sensitive to and accurate at the permitted level of 0.01 mg/L. Report the magnitude and duration of all non-zero chlorine residual events within the reporting period.

2 Concurrent with whole effluent toxicity monitoring.

3 pH of effluent shall be measured continuously at one second intervals and tracked as a 20-minute running average. The highest and lowest 20-minute averages each day will be reported.

4 For priority pollutant constituents with effluent limitations, detection limits shall be below the effluent limitations. If the lowest minimum level (ML) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Plan or SIP) is not below the effluent limitation, the detection limit shall be the lowest ML technically and economically achievable. For priority pollutant constituents without effluent limitations, the detection limits shall be equal to or less than the lowest ML published in Appendix 4 of the SIP. Sampling and analysis of Bis (2-ethylhexyl) phthalate shall be conducted using ultra-clean techniques that eliminate the possibility of sample contamination.

5 Unfiltered methylmercury and total mercury samples shall be taken using clean hands/dirty hands procedures, as described in U.S. EPA method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels, for collection of equipment blanks (section 9.4.4.2), and shall be analyzed by U.S. EPA method 1630/1631 (Revision E) with a method detection limit of 0.02 ng/l for methylmercury and 0.2 ng/l for total mercury.

6 24-hour flow proportioned composite. In the event of composite sample malfunction, a grab sample must be substituted.

7 Concurrent with hardness monitoring.

8 Samples taken at the effluent without preservatives, may be analyzed for cyanide within 15 minutes from collection and must be performed by a laboratory certified for such analyses by the State Department of Public Health.

9 An annual summary of effluent diversions to include date, time, duration and reason for the diversion.

10 In order to verify if bis (2-ethylhexyl) phthalate is truly present in the effluent discharge, the Discharger shall take steps to assure that sample containers, sampling apparatus, and analytical equipment are not sources of the detected contaminant.

11 Compliance with the final effluent limitations for aluminum can be demonstrated using either total or acid-soluble (inductively coupled plasma/atomic emission spectrometry or inductively coupled plasma/mass spectrometry) analysis methods, as supported by USEPA's Ambient Water Quality Criteria for Aluminum document (EPA 440/5-86-008), or other standard methods that exclude aluminum silicate particles as approved by the Executive Officer.

12 Running Hourly Average/Running Hourly Average. Report lowest, highest, and average ratio calculated for each day.

13 Continuous effluent turbidity monitoring is required effective **1 December 2020** or upon compliance with Special Provisions VI.C.6.a, whichever is sooner. Upon compliance with Special Provisions VI.C.6.a of the Permit, location for measurement of effluent turbidity may change due to change in disinfection systems.

14 A concurrent temperature sample should be taken.

B. Effluent Characterization Monitoring Location EFF-001

1. The Discharger shall monitor final dechlorinated effluent at EFF-001 as follows in Table E-3b. Beginning 1 January 2013, the Discharger shall monitor monthly for one calendar year (concurrent with receiving water characterization monitoring) and repeat the monitoring every other calendar year, beginning 1 January of that year. The effluent characterization monitoring results shall be submitted with the receiving water characterization monitoring results required in Table E-6b and may be submitted separate from the Self-Monitoring Reports, but no later than 1 April of the year following the calendar year of sampling.

Table E-3b. Effluent Characterization Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Electrical Conductivity @ 25 Deg. C	µmhos/cm	Grab	1/month-every other year[1]	--
Total Dissolved Solids (TDS)	mg/L	Grab	1/month-every other year[1]	--
Dioxin[10]	µg/L	--	--	--
Pyrethroids[6]	ng/L	24-hr Composite[4]	1/month-every other year[1]	--
Priority Pollutants[2]	µg/L	[8]	1/month-every other year[1]	--
Standard Minerals[3]	mg/L	24-hr Composite[4]	1/month-every other year[1]	--
Non-CTR Persistent Chlorinated Hydrocarbon Pesticides[5]	µg/L	24-hr Composite[4]	1/month-every other year[1]	--
Other Constituents of Concern[7]	µg/L	24-hr Composite[4]	1/month-every other year[1]	--
Hardness (as $CaCO_3$)[9]	mg/L	24-hr Composite[4]	1/month-every other year[1]	--
Alkalinity	mg/L	24-hr Composite[4]	1/month-every other year[1]	--

1 Monthly sampling for the 2013 calendar year and every other calendar year thereafter. These samples should be taken during the same time that monthly receiving water samples are taken for the Coordinated Monitoring Program (CMP)

2 Priority pollutants include all 126 priority pollutants listed in the California Toxics Rule (CTR, 40 CFR 131.38), except dioxin. For priority pollutant constituents with effluent limitations, detection limits shall be below the effluent limitations. If the lowest minimum level (ML) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Plan or SIP) is not below the effluent limitation, the detection limit shall be the lowest ML. For priority pollutant constituents without effluent limitations, the detection limits shall be equal to or less than the lowest ML published in Appendix 4 of the SIP.

3 Standard minerals shall include the following: boron, calcium, iron, magnesium, potassium, sodium, chloride, manganese, phosphorus, total alkalinity (including alkalinity series), and hardness, and include verification that the analysis is complete (i.e., cation/anion balance).

4 24-hour flow proportioned composite.

[5] Non-CTR Persistent Chlorinated Hydrocarbon pesticides include:

Captan	Dicofol	Mirex
2,4-D	Dinoseb	PCNB (Pentachloronitrobenzene)
2,4-DB	Isodrin (an isomer of Aldrin)	Perthane
2,4-D compounds	Kepone (Chlordecone)	Strobane
Dalapon	MCPA	2,4,5-T
Dicamba	MCPP	2,4,5,TP (Silvex)
Dichloran	Methoxychlor	2,4,5-T compounds
Dichloroprop		

[6] Pyrethroids to include bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin and permethrin.

[7] Other Constituents of Concern include:

Aluminum		
Alachlor	Di(2-ethylhexyl)adipate	Picloram
Atrazine	Endothal	Radionuclides
Barium	Ethylene dibromide	Simazine
Bentazon	Fluoride	Styrene
Carbofuran	Glyphosate	Sulfate
NEMA and NDEA	MBAS	Sulfide
Chromium, Total	Oxamyl	Trichlorofluoromethane
Diquat	Sulfite	1,1,2-trichloro-1,2,2-trifluoroethane
1,2-dibromo-3-chloropropane (DBCP)	Thiobencarb	Xylenes
Molinate (ordram)	Tributyltin	Disulfoton

[8] Sample types for priority pollutant volatile organic compounds and semi-volatile organic compounds, cyanide, and mercury shall be collected as grab samples. All other priority pollutant constituents shall be 24-hour flow proportioned composite samples.

[9] Hardness must be sampled concurrently with Priority Pollutant sampling.

[10] Dioxin sampling shall be in accordance with Attachment I.

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

A. Acute Toxicity Testing. The Discharger shall conduct acute toxicity testing to determine whether the effluent is contributing acute toxicity to the receiving water. The Discharger shall meet the following acute toxicity testing requirements:

1. *Monitoring Frequency* – The Discharger shall perform a weekly 96-hour continuous flow-through acute toxicity testing, concurrent with effluent ammonia sampling.

2. *Sample Types* –The effluent shall be taken at the effluent monitoring location EFF-001. If the flow-through bioassay is not available for use, static renewal testing may be used. For static renewal testing, the samples shall be flow proportional 24-hour composites samples and shall be representative of the volume and quality of the discharge.

3. *Test Species* – **Effective immediately**, the test species shall be fathead minnows (*Pimephales promelas*). **Effective 1 July 2011** the test species shall be rainbow trout (*Oncorhynchus mykiss*).

4. *Methods* – The acute toxicity testing samples shall be analyzed using EPA-821-R-02-012, Fifth Edition and its subsequent amendments or revisions. Temperature,

total residual chlorine, and pH shall be recorded at the time of sample collection. No pH adjustment may be made unless approved by the Executive Officer.

5. *Test Failure* – If an acute toxicity test does not meet all test acceptability criteria, as specified in the test method, the Discharger must take all reasonable steps to determine reason for test failure.

B. Chronic Toxicity Testing. The Discharger shall conduct three species chronic toxicity testing on RSWU-001 and RSWD-003 and the effluent at EFF-001 to determine whether the effluent is contributing chronic toxicity to the receiving water. The Discharger shall meet the following chronic toxicity testing requirements:

1. *Monitoring Frequency* – The Discharger shall perform monthly three species chronic toxicity testing.

2. *Sample Types* – Effluent samples shall be flow proportional 24-hour composites and shall be representative of the volume and quality of the discharge. The effluent samples shall be taken at the effluent monitoring location EFF-001. The receiving water shall be a grab sample obtained from the RSWU-001 sampling location and RSWD-003 as identified in this Monitoring and Reporting Program.

3. *Sample Volumes* – Adequate sample volumes shall be collected to provide renewal water to complete the test in the event that the discharge is intermittent.

4. *Test Species* – Chronic toxicity testing measures sublethal (e.g., reduced growth, reproduction) and/or lethal effects to test organisms exposed to an effluent compared to that of the control organisms. The Discharger shall conduct chronic toxicity tests with:

   a. The cladoceran, water flea, *Ceriodaphnia dubia* (survival and reproduction test);

   b. The fathead minnow, *Pimephales promelas* (larval survival and growth test); and

   c. The green alga, *Selenastrum capricornutum* (growth test).

5. *Methods* – The presence of chronic toxicity shall be estimated as specified in Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA/821-R-02-013, October 2002 and its subsequent amendments or revisions.

6. *Reference Toxicant* – As required by the SIP, all chronic toxicity tests shall be conducted with concurrent testing with a reference toxicant and shall be reported with the chronic toxicity test results.

7. *Dilutions* – The chronic toxicity testing shall be performed using the dilution series identified in the table, below. The receiving water control (RSWU-001) shall be used as the diluent (unless the receiving water is toxic). If the receiving water is toxic, lab control water may be substituted as the diluent.

Table E-4. Chronic Toxicity Testing Dilution Series

Sample	Dilutions (%)					Controls	
% EFF-001	100	50	25	12.5	6.25	--	--
% RSWU-001	0	50	75	87.5	93.75		100
% RSWD-003	0	0	0	0	0		100
% Laboratory Water	0	0	0	0	0		100

8. *Test Failure* – The Discharger must re-sample and re-test as soon as possible, but no later than fourteen (14) days after receiving notification of a test failure. A test failure is defined as follows:

a. The reference toxicant test or the effluent test does not meet all test acceptability criteria as specified in the Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA/821-R-02-013, October 2002 (Method Manual), and its subsequent amendments or revisions; or

b. The percent minimum significant difference (PMSD) measured for the test exceeds the upper PMSD bound variability criterion in Table 6 on page 52 of the Method Manual. (A retest is only required in this case if the test results do not exceed the monitoring trigger specified in the Special Provision at section VI. 2.a.iii. of the Order.)

C. WET Testing Notification Requirements. The Discharger shall notify the Central Valley Water Board within 24-hours after the receipt of test results exceeding the monitoring trigger during regular or accelerated monitoring, or an exceedance of the acute toxicity effluent limitation.

D. WET Testing Reporting Requirements. All toxicity test reports shall include the contracting laboratory's complete report provided to the Discharger and shall be in accordance with the appropriate "Report Preparation and Test Review" sections of the method manuals. At a minimum, whole effluent toxicity monitoring shall be reported as follows:

1. Chronic WET Reporting. Regular chronic toxicity monitoring results shall be reported to the Central Valley Water Board within 45 days following completion of the test, and shall contain, at minimum:

a. The results expressed in TUc, measured as 100/NOEC, and also measured as 100/LC50, 100/EC25, 100/IC25, and 100/IC50, as appropriate.

b. The statistical methods used to calculate endpoints;

c. The statistical output page, which includes the calculation of the percent minimum significant difference (PMSD);

d. The dates of sample collection and initiation of each toxicity test; and

e. The results compared to the numeric toxicity monitoring trigger.

Additionally, an annual report shall be submitted 1 February of each year that contains chronic toxicity test results for the previous calendar year expressed in TUc, and organized by test species, type of test (survival, growth or reproduction), and monitoring frequency, i.e., either quarterly, monthly, accelerated, or Toxicity Reduction Evaluation (TRE).

2. **Acute WET Reporting.** Acute toxicity test results shall be submitted with the monthly discharger self-monitoring reports and reported as percent survival. If more than one tank is used in the testing, percent survival for all tanks shall be reported. Additionally, the monthly discharge self-monitoring reports shall contain an updated chronology of the last 12 months of acute toxicity test results.

3. **TRE Reporting.** Reports for TREs shall be submitted in accordance with the schedule contained in the Discharger's approved TRE Workplan.

4. **Quality Assurance (QA).** The Discharger must provide the following information for QA purposes :

   a. Results of the applicable reference toxicant data with the statistical output page giving the species, NOEC, LOEC, type of toxicant, dilution water used, concentrations used, PMSD, and dates tested.

   b. The reference toxicant control charts for each endpoint, which include summaries of reference toxicant tests performed by the contracting laboratory.

   c. Any information on deviations or problems encountered and how they were dealt with.

VI. LAND DISCHARGE MONITORING REQUIREMENTS

A. Monitoring Locations ESB (A through E)

1. The Discharger shall monitor **diverted influent or treated effluent** at the Emergency Storage Basins, when wastewater is present, as follows:

Table E-5. Land Discharge Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Reason for Diversion	--	Narrative	--	--
Duration of Diversion	hours	Narrative	Per each intermittent diversion event	--

Description (Influent or Effluent)	--	Narrative	Per each intermittent diversion event	--
Freeboard	0.1 feet	Measured	Weekly	--

VII. RECLAMATION MONITORING REQUIREMENTS

A. Reclamation sampling shall be done in accordance with Waste Discharge Requirements Order No. 97-146 or subsequent Orders that regulate the reclamation of treated wastewater.

VIII. RECEIVING WATER MONITORING REQUIREMENTS – SURFACE WATER AND GROUNDWATER

A. Monitoring Locations RSWU-001, RSWD-003, RSWD-004 and RSWD-005

1. The Discharger shall monitor Sacramento River at RSWU-001, RSWD-003, RSWD-004 and RSWD-005 as follows:

Table E-6a. Receiving Water Monitoring Requirements- Monitoring Locations RSWU-001 through RSWD-005

Parameter	Units	Sample Type	Minimum Sampling Frequency[1]	Required Analytical Test Method
Flow (at RSWU-001 only)	cfs	--	Continuous	--
Fecal Coliform Organisms	MPN/100 mL	Grab	1/Quarter	--
pH[1]	standard units	Grab	1/Week	--
Ammonia Nitrogen, Total (as N)[1]	mg/L	Grab	1/Week	--
Nitrogen, Total	mg/L	Grab	1/Week	--
Dissolved Oxygen	mg/L	Grab	1/Week	--
Electrical Conductivity@ 25°C	µmhos/cm	Grab	1/Week	--
Hardness (as $CaCO_3$)	mg/L	Grab	1/Month	--
Alkalinity (as $CaCO_3$)	mg/L	Grab	1/Month	--
Temperature[1]	°F	Grab	1/Week	--
Turbidity	NTU	Grab	1/Week	--

[1] Temperature and pH shall be collected at the same time as the ammonia sample.

2. The Discharger shall monitor Sacramento River at RSWU-001 as follows in Table E-6b. Beginning 1 January 2013, the Discharger shall monitor monthly for one calendar year (concurrent with effluent characterization monitoring) and repeat the monitoring every other calendar year. The monitoring results shall be submitted with the effluent characterization monitoring results as required in Table E-3b and may be submitted separate from the Self-Monitoring Reports, but no later than 1 April of the year following the calendar year of sampling.

Table E-6b. Receiving Water Monitoring Requirements – Monitoring Location RSWU-001

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Electrical Conductivity @ 25 Deg. C	µmhos/cm	Grab	1/month-every other year[1]	--
Total Dissolved Solids (TDS)	mg/L	Grab	1/month-every other year[1]	--
Chlorpyrifos	µg/L	Grab	1/month-every other year[1]	EPA Method 625M; Method 8141, or equivalent GC/MS
Diazinon	µg/L	Grab	1/month-every other year[1]	EPA Method 625M Method 8141, or equivalent GC/MS
Dioxin[8]	µg/L	--	--	--
Pyrethroids[5]	ng/L	Grab	1/month-every other year[1]	--
Priority Pollutants[2]	µg/L	Grab	1/month-every other year[1]	--
Standard Minerals[3]	mg/L	Grab	1/month-every other year[1]	--
Non-CTR Persistent Chlorinated Hydrocarbon Pesticides[4]	µg/L	Grab	1/month-every other year[1]	--
Other Constituents of Concern[6]	µg/L	Grab	1/month-every other year[1]	--
Hardness (as $CaCO_3$)[7]	mg/L	Grab	1/month-every other year[1]	--
Alkalinity (as $CaCO_3$)	mg/L	Grab	1/month-every other year[1]	–

1 Monthly sampling for the 2013 calendar year and every other calendar year thereafter. These samples should be taken during the same time that monthly receiving water samples are taken for the Coordinated Monitoring Program (CMP).

2 Priority pollutants include all 126 priority pollutants listed in the California Toxics Rule (CTR, 40 CFR 131.38), except dioxin. For priority pollutant constituents with effluent limitations, detection limits shall be below the effluent limitations. If the lowest minimum level (ML) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Plan or SIP) is not below the effluent limitation, the detection limit shall be the lowest ML. For priority pollutant constituents without effluent limitations, the detection limits shall be equal to or less than the lowest ML published in Appendix 4 of the SIP.

3 Standard minerals shall include the following: boron, calcium, iron, magnesium, potassium, sodium, chloride, manganese, phosphorus, total alkalinity (including alkalinity series), and hardness, and include verification that the analysis is complete (i.e., cation/anion balance).

4 Non-CTR Persistent Chlorinated Hydrocarbon pesticides include:

Captan	Dicofol	Mirex
2,4-D	Dinoseb	PCNB (Pentachloronitrobenzene)
2,4-DB	Isodrin (an isomer of Aldrin)	Perthane
2,4-D compounds	Kepone (Chlordecone)	Strobane
Dalapon	MCPA	2,4,5-T
Dicamba	MCPP	2,4,5,TP (Silvex)
Dichloran	Methoxychlor	2,4,5-T compounds
Dichloroprop		

5 Pyrethroids to include bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin and permethrin.

6 Other Constituents of Concern include:
Aluminum

Alachlor	Di(2-ethylhexyl)adipate	Picloram
Atrazine	Endothal	Radionuclides
Barium	Ethylene dibromide	Simazine
Bentazon	Fluoride	Styrene
Carbofuran	Glyphosate	Sulfate
NEMA and NDEA	MBAS	Sulfide
Chromium, Total	Oxamyl	Trichlorofluoroethane
Diquat	Sulfite	1,1,2-trichloro-1,2,2-trifluoromethane
1,2-dibromo-3-chloropropane (DBCP)	Thiobencarb	Xylenes
Molinate (ordram)	Tributyltin	Disulfoton

7 Hardness must be sampled concurrently with Priority Pollutant sampling.
8 Dioxin sampling shall be in accordance with Attachment I.

3. In conducting the receiving water sampling when discharging to Sacramento River at Discharge Point No. 001, a log shall be kept of the receiving water conditions throughout the reach bounded by Monitoring Locations RSW-001 and RSW-003 and the reach bounded by Monitoring Locations RSW-004 and RSW-005. Attention shall be given to the presence or absence of:

   a. Floating or suspended matter;
   b. Discoloration;
   c. Bottom deposits;
   d. Aquatic life;
   e. Visible films, sheens, or coatings;
   f. Fungi, slimes, or objectionable growths; and
   g. Potential nuisance conditions.

   Notes on receiving water conditions shall be summarized in the monitoring report.

B. Groundwater Monitoring Locations (Not Applicable)

Groundwater monitoring at the facility shall be conducted in accordance with Waste Discharge Requirements R5-2003-0076 or subsequent Orders that regulate the disposal of biosolids and protection of groundwater in the vicinity of the biosolids disposal.

IX. OTHER MONITORING REQUIREMENTS

A. Biosolids (Not Applicable)

Biosolids sampling and disposal shall be conducted in accordance with Waste Discharge Requirements Order No. R5-2003-0076 or subsequent Orders that regulate the disposal of biosolids.

B. Municipal Water Supply

1. Monitoring Location SPL-001

The Discharger shall monitor the municipal water supply at SPL-001 as follows. A sampling station shall be established where a representative sample of the municipal water supply can be obtained. Municipal water supply samples shall be collected at approximately the same time as effluent samples.

Table E-7. Municipal Water Supply Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Total Dissolved Solids[1]	mg/L	Grab	1/year	--
Electrical Conductivity @ 25°C[1]	µmhos/cm	Grab	1/year	--
Standard Minerals[1,2]	mg/L	Grab	1/year	--

[1] If the water supply is from more than one source, the total dissolved solids and electrical conductivity shall be reported as a weighted average and include copies of supporting calculations. Alternatively, the Discharger may composite individual grab samples on a flow-weighted basis from multiple locations to represent the water supply within the service area. Composited samples must be taken in accordance with the sample handling and preservation requirements specified in 40 CFR Part 136. Water supply quality and quantity information collected by water supply agencies and companies may be used for the calculations.

[2] Standard minerals shall include all major cations and anions and include verification that the analysis is complete (i.e., cation/anion balance).

X. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

1. The Discharger shall comply with all Standard Provisions (Attachment D) related to monitoring, reporting, and recordkeeping.

2. Upon written request of the Regional Water Board, the Discharger shall submit a summary monitoring report. The report shall contain both tabular and graphical summaries of the monitoring data obtained during the previous year(s).

3. **Compliance Time Schedules.** For compliance time schedules included in the Order, the Discharger shall submit to the Regional Water Board, on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Water Board by letter when it returns to compliance with the compliance time schedule.

4. The Discharger shall report to the Regional Water Board any toxic chemical release data it reports to the State Emergency Response Commission within 15 days of

reporting the data to the Commission pursuant to section 313 of the "*Emergency Planning and Community Right to Know Act*" of 1986.

B. Self Monitoring Reports (SMRs)

1. At any time during the term of this permit, the State Water Board or the Central Valley Water Board may notify the Discharger to electronically submit Self-Monitoring Reports (SMRs) using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Discharger shall submit hard copy SMRs. The CIWQS Web site will provide additional directions for SMR submittal in the event there will be service interruption for electronic submittal.

2. The Discharger shall report in the SMR the results for all monitoring specified in this Monitoring and Reporting Program under sections III through IX, except that the monitoring required in Table E-3b and E-6b, and Groundwater Corrective Action Program (CAP) Monitoring required in Table E-2b, may be submitted as a separate reports as specified in this Monitoring and Reporting Program. The Discharger shall submit monthly SMRs including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order. If the Discharger monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR. Sampling to meet one requirement may be used to satisfy another monitoring requirement (e.g., during the calendar year effluent characterization monitoring of priority pollutants is required per Table E-3b, the monitoring may satisfy the monthly effluent monitoring for the priority pollutants required in Table E-3a).

3. Monitoring periods and reporting for all required monitoring shall be completed according to the following schedule:

Table E-8. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On...	Monitoring Period	SMR Due Date
Continuous	Permit effective date	All	First day of second calendar month following month of sampling
1/Day	Permit effective date	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling.	First day of second calendar month following month of sampling
1/Week	Permit effective date	Sunday through Saturday	First day of second calendar month following month of sampling
2/Week	Permit effective date	Sunday through Saturday	First day of second calendar month following month of sampling

Sampling Frequency	Monitoring Period Begins On...	Monitoring Period	SMR Due Date
3/Week	Permit effective date	Sunday through Saturday	First day of second calendar month following month of sampling
1/Month	Permit effective date	1st day of calendar month through last day of calendar month	First day of second calendar month following month of sampling
2/Month	Permit effective date	1st day of calendar month through last day of calendar month	First day of second calendar month following month of sampling
1/Quarter	Permit effective date	1 January through 31 March 1 April through 30 June 1 July through 30 September 1 October through 31 December	1 May 1 August 1 November 1 February
1/Year	Permit effective date	January 1 through December 31	1 February
2/Year	Permit effective date	1 January through 30 June 1 July through 31 December	1 August 1 February

4. **Reporting Protocols.** The Discharger shall report with each sample result the applicable reported Minimum Level (ML) and the current Method Detection Limit (MDL), as determined by the procedure in 40 CFR Part 136.

   The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

   a. Sample results greater than or equal to the reported ML shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

   b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

      For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (+ a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

   c. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

d. Dischargers are to instruct laboratories to establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

5. **Compliance Determination.** Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined above and in Attachment A of this Order. For purposes of reporting and administrative enforcement by the Regional Water Board and the State Water Board, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reporting level (RL).

6. **Multiple Sample Data.** When determining compliance with an AMEL, AWEL, or MDEL for priority and non-priority pollutants and more than one sample result is available, the Discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of "Detected, but Not Quantified" (DNQ) or "Not Detected" (ND). In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

   a. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

   b. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

7. The Discharger shall submit SMRs in accordance with the following requirements:

   a. In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements (e.g., effluent limitations and discharge specifications, receiving water limitations, special provisions, etc.). The highest daily maximum for the month and monthly and weekly averages shall be determined and recorded as needed to demonstrate compliance. In addition, the following shall be calculated and reported in the SMRs:

      i. **Annual Average Limitations**. For constituents with effluent limitations specified as "calendar annual average" (e.g., aluminum and EC) the Discharger shall report the calendar annual average in the December SMR.

The calendar annual average shall be calculated as the average of the monthly averages for January through December.

ii. **Mass Loading Limitations.** For BOD_5, TSS, and ammonia, the Discharger shall calculate and report the mass loading (lbs/day) in the SMRs. The mass loading shall be calculated as follows:

Mass Loading (lbs/day) = Flow (MGD) x Concentration (mg/L) x 8.34

When calculating daily mass loading, the daily average flow and constituent concentration shall be used. For weekly average mass loading, the weekly average flow and constituent concentration shall be used. For monthly average mass loading, the monthly average flow and constituent concentration shall be used.

iii. **Mercury**. The Discharger shall calculate and report effluent total annual mass loading of total mercury in the December SMR. The total annual mass loading shall be calculated as specified in Section VII.G. of the Limitations and Discharge Requirements.

iv. **Removal Efficiency (BOD_5 and TSS).** The Discharger shall calculate and report the percent removal of BOD_5 and TSS in the SMRs. The percent removal shall be calculated as specified in Section VII.A. of the Limitations and Discharger Requirements.

v. **Average Dry Weather Flow.** The Discharger shall calculate and report the average dry weather flow for the Facility discharge in the December SMR. The average dry weather flow shall be calculated annually as specified in Section VII.D. of the Limitations and Discharge Requirements.

vi. **Total Coliform Organisms Effluent Limitations.** The Discharger shall calculate and report the 7-day median of total coliform organisms for the effluent. The 7-day median of total coliform organisms shall be calculated as specified in Section VII.C. of the Order.

vii. **Dissolved Oxygen Receiving Water Limitations.** The Discharger shall report monthly in the self-monitoring report the dissolved oxygen concentration of the receiving water.

viii. **Turbidity Receiving Water Limitations.** The Discharger shall calculate and report the turbidity increase in the receiving water applicable to the natural turbidity condition specified in Section V.A.17.a-d. of the Order.

b. Unless otherwise specified, all constituents monitored on a continuous basis (metered), shall be reported as daily maximums, daily minimums, and daily averages; flow shall be reported as the total volume discharged per day for each day of discharge.

c. A letter transmitting the SMRs shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions.

d. SMRs must be submitted to the Regional Water Board, signed and certified as required by the Standard Provisions (Attachment D), to the address listed below:

Regional Water Quality Control Board
Central Valley Region
NPDES Compliance and Enforcement Unit
11020 Sun Center Dr., Suite #200
Rancho Cordova, CA 95670-6114

C. Discharge Monitoring Reports (DMRs)

1. DMRs must be signed and certified as required by the standard provisions (Attachment D). The Discharger shall submit the original DMR and one copy of the DMR to the address listed below:

STANDARD MAIL	FEDEX/UPS/ OTHER PRIVATE CARRIERS
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

2. All discharge monitoring results must be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format of EPA Form 3320-1.

D. Other Reports

1. **Progress Reports.** As specified in the compliance time schedules required in the Special Provisions contained in section VI.C. of the Order, progress reports shall be submitted in accordance with the following reporting requirements. At minimum, the progress reports shall include a discussion of the status of final compliance, whether the Discharger is on schedule to meet the final compliance date, and the remaining tasks to meet the final compliance date.

Table E-9. Reporting Requirements for Special Provisions Progress Reports

Special Provision	Reporting Requirements
Pollution Prevention Plan for mercury Annual Report (Section VI.C.3.a)	**1 February**, annually, after approval of updated pollution prevention plan
Title 22 Disinfection Requirements (Section VI.C.7.a)	**1 February**, annually, until final compliance
Salinity Evaluation and Minimization Plan Annual Report (Section VI.C.3.b)	**1 February**, annually, after approval of plan
Compliance Schedules for Final Effluent Limitations for ammonia, compliance with final effluent limitations. (Section VI.C.7.b)	**1 February**, annually, until final compliance

2. The Discharger shall report the results of any special studies such as acute and chronic toxicity testing, TRE/TIE, Pollution Prevention Plans, Salinity Evaluation and Minimization Plan, and 2,3,7,8-TCDD and other Dioxin and Furan Congeners Source Evaluation and Minimization Plan required in this Order. The Discharger shall report the progress in satisfaction of compliance schedule dates specified in the Special Provision at section VI.C.7 of this Order. The Discharger shall submit reports with the first monthly SMR scheduled to be submitted on or immediately following the report due date AND/OR in compliance with SMR reporting requirements described in subsection X.B. above.

3. Within 90 days of permit adoption, the Discharger shall submit a report outlining minimum levels, method detection limits, and analytical methods for approval, with a goal to achieve detection levels below applicable water quality criteria. At a minimum, the Discharger shall comply with the monitoring requirements for CTR constituents as outlined in section 2.3 and 2.4 of the SIP.

4. **Annual Operations Report.** By 1 February of each year, the Discharger shall submit a written report to the Executive Officer containing the following:

   a. The names, certificate grades, and general responsibilities of all persons employed at the Facility.

   b. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.

   c. A statement certifying when the flow meter(s) and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration.

   d. A statement certifying whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment plant as currently constructed and operated, and the dates when these documents were last revised and last reviewed for adequacy.

e. The Discharger may also be requested to submit an annual report to the Central Valley Water Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

5. Annual Pretreatment Reporting Requirements

a. The Discharger shall submit annually a report to the Regional Water Board, with copies to USEPA Pacific Southwest Region and the State Water Board, describing its pretreatment activities over the previous 12 months. In the event that the Discharger is not in compliance with any conditions or requirements of this Order, then the Discharger shall also include the reasons for noncompliance and state how and when the Discharger shall comply with such conditions and requirements. This annual report shall cover operations from 1 January through 31 December and is due by **25 March** of each year. The report shall contain, but not be limited to, the following information:

i. A summary of analytical results from representative, flow proportioned, 24-hour composite sampling of the Publicly Owned Treatment Works (POTW's) influent and effluent for those pollutants USEPA has identified under section 307(a) of the CWA which are known or suspected to be discharged by nondomestic users. This will consist of an annual full priority pollutant scan, with quarterly samples analyzed only for those pollutants detected in the full scan. The Discharger is not required to sample and analyze for asbestos. Sampling and analysis shall be performed in accordance with the techniques prescribed in 40 CFR Part 136 and amendments thereto.

ii. A discussion of Upset, Interference, or Pass Through incidents, if any, at the treatment plant which the Discharger knows or suspects were caused by nondomestic users of the POTW system. The discussion shall include the reasons why the incidents occurred, the corrective actions taken and, if known, the name and address of, the nondomestic user(s) responsible. The discussion shall also include a review of the applicable pollutant limitations to determine whether any additional limitations, or changes to existing requirements, may be necessary to prevent pass through or interference, or noncompliance with sludge disposal requirements.

iii. The cumulative number of industrial users that the Discharger has notified regarding Baseline Monitoring Reports and the cumulative number of industrial user responses.

iv. An updated list of the Discharger's significant industrial users (SIUs) including their names and addresses, and a list of deletions, additions, and SIU name changes keyed to the previously submitted list. The Discharger shall provide a brief explanation for each change. The list shall identify the SIUs subject to federal categorical standards by specifying which set(s) of standards are applicable to each SIU. The list shall also indicate the SIUs subject to federal categorical standards by specifying which set(s) of standards are applicable to each SIU. The list shall also indicate which SIUs are subject to local discharge limitations.

v. The Discharger shall characterize the compliance status of each SIU through the year of record by providing a list or table which includes the following information for each industrial user:

a. Name of the SIU;

b. Category, if subject to federal categorical standards;

c. The type of wastewater treatment or control processes in place;

d. The number of samples taken by the Discharger during the year;

e. The number of samples taken by the SIU during the year;

f. For an SIU subject to discharge requirements for total toxic organics, whether all required certifications were provided;

g. Whether the SIU complied with baseline monitoring report requirements (where applicable);

h. Whether the SIU consistently achieved compliance;

i. Whether the SIU inconsistently achieved compliance;

j. A list of the standards violated during the year. Identify whether the violations were for categorical standards or local limits;

k. Whether the SIU is in significant noncompliance with applicable pretreatment requirements as defined by 40 CFR 403.8(f)(2)(vii);

l. Whether the SIU complied with schedule to achieve compliance (include the date final compliance is required);

m. Whether the SIU did not achieve compliance and not on a compliance schedule; and

n. Whether compliance status unknown.

o. A summary of enforcement or other actions taken during the year to return the SIU to compliance. Describe the type of action, final compliance date, and the amount of fines and penalties collected, if any. Describe any proposed actions for bringing the SIU into compliance.

A report describing the compliance status of each industrial user characterized by the descriptions in items a. through o. above shall be included as part of the annual report. The report shall identify the specific compliance status of each such industrial user and shall also identify the compliance status of the POTW with regards to audit/pretreatment compliance inspection requirements.

vi. A brief description of any programs the Discharger implements to reduce pollutants from nondomestic users that are not classified as SIUs.

vii. A brief description of any significant changes in operating the pretreatment program which differ from the previous year including, but not limited to, changes concerning the program's administrative structure, local industrial discharge limitations, monitoring program or monitoring frequencies, legal authority or enforcement policy, funding mechanisms, or staffing levels.

viii. A summary of the annual pretreatment budget, including the cost of pretreatment program functions and equipment purchases.

ix. A summary of activities to involve and inform the public of the program including a copy of the newspaper notice, if any, required under 40 CFR 403.8(f)(2)(vii).

x. A summary of the inspection and sampling activities conducted by the Discharger during the past year to gather information and data regarding the industrial users. The summary shall include:

a. the names and addresses of the industrial users subjected to surveillance and an explanation of whether they were inspected, sampled, or both and the frequency of these activities at each user; and

b. the conclusions or results from the inspection or sampling of each industrial user.

xi. A summary of the compliance and enforcement activities during the past year. The summary shall include the names and addresses of the industrial users affected by the following actions:

a. Warning letters or notices of violation regarding the industrial users' apparent noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the apparent violation concerned the federal categorical standards or local discharge limitations.

b. Administrative orders regarding the industrial users noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the violation concerned the federal categorical standards or local discharge limitations.

c. Civil actions regarding the industrial users' noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the violation concerned the federal categorical standards or local discharge limitations.

d. Criminal actions regarding the industrial users noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the violation concerned the federal categorical standards or local discharge limitations.

e. Assessment of monetary penalties. For each industrial user identify the amount of the penalties.

f. Restriction of flow to the POTW.

g. Disconnection from discharge to the POTW.

b. The Discharger shall submit a semi-annual SIU noncompliance status report to the Regional Water Board, USEPA Pacific Southwest Region, and the State Water Board. The report shall cover the period of 1 January through 30 June, and shall be submitted by 31 July. The report shall contain:

i. The name and address of all SIUs which violated any discharge or reporting requirements during the report period;

ii. A description of the violations including whether any discharge violations were for categorical standards or local limits;

iii. A description of the enforcement or other actions that were taken to remedy the noncompliance; and

iv. The status of active enforcement and other actions taken in response to SIU noncompliance identified in previous reports.

Duplicate signed copies of these Pretreatment Program reports shall be submitted to the Regional Water Board and the:

State Water Resources Control Board
Division of Water Quality
1001 I Street or P.O. Box 100
Sacramento, CA 95812

and the

Regional Pretreatment Coordinator
CWA Compliance Office (WTR-7)
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

ATTACHMENT F – FACT SHEET

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ATTACHMENT F – FACT SHEET

As described in the Findings in section II of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for Dischargers in California. Only those sections or subsections of this Order that are specifically identified as "not applicable" have been determined not to apply to this Discharger. Sections or subsections of this Order not specifically identified as "not applicable" are fully applicable to this Discharger.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the Facility.

Table F-1. Facility Information

WDID	5A340108002
Discharger	Sacramento Regional County Sanitation District
Name of Facility	Sacramento Regional Wastewater Treatment Plant
Facility Address	8521 Laguna Station Road
	Elk Grove, CA 95758
	Sacramento County
Facility Contact, Title and Phone	Stanley R. Dean, District Engineer, (916) 875-9101
Authorized Person to Sign and Submit Reports	Stanley R. Dean, District Engineer, (916) 875-9101
Mailing Address	10060 Goethe Road, Sacramento, CA 95827
Billing Address	Same
Type of Facility	POTW
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	A
Pretreatment Program	Y
Reclamation Requirements	Master Water Reclamation Permit No. 97-146
Facility Permitted Flow	181 million gallons per day (mgd)
Facility Design Flow	181 mgd
Watershed	Sacramento Watershed
Receiving Water	Sacramento River
Receiving Water Type	Sacramento-San Joaquin Delta

A. Sacramento Regional County Sanitation District (hereinafter Discharger) is the owner and operator of Sacramento Regional Wastewater Treatment Plant (hereinafter Facility), a Publicly-Owned Treatment Works.

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. The Facility discharges wastewater to the Sacramento River within the Sacramento-San Joaquin Delta, a water of the United States, and was previously regulated by Order No. 5-00-188 which was adopted on 4 August 2000 and expired on 1 August 2005. The terms and conditions of the previous Order were administratively continued and remained in effect until this Order, serving as new Waste Discharge Requirements (WDRs) and a renewed National Pollutant Discharge Elimination System (NPDES) permit, was adopted pursuant to this Order.

C. The Discharger filed a report of waste discharge and submitted an application for renewal of its Waste Discharge Requirements (WDRs) and National Pollutant Discharge Elimination System (NPDES) permit on 1 February 2005. Supplemental information was requested on 19 August 2008 and received on 24 August 2010. A site visit was conducted on 22 July 2008, to observe operations and collect additional data to develop permit limitations and conditions. Additional information and reports were submitted by the Discharger for development of this Order.

II. FACILITY DESCRIPTION

The Discharger provides wastewater treatment service to the Cities of Sacramento, Folsom, and West Sacramento, the communities of Courtland and Walnut Grove, and the Sacramento Area Sewer District. The Sacramento Area Sewer District service area includes the Cities of Elk Grove, Rancho Cordova, Citrus Heights, as well as, portions of the unincorporated areas of Sacramento County. The population served is approximately 1.3 million people. The collection systems are owned and operated by the various contributing agencies and not by the Discharger, and are regulated under the State Water Board general order, Water Quality Order No. 2006-0003, effective November 2006. The City of Sacramento operates both a separate sewer collection system and a combined (storm water and wastewater) collection system. During wet weather the Facility is contracted to accept up to 60 mgd of wastewater and storm runoff from the downtown Sacramento combined collection system. Combined collection flows in excess of 60 mgd are managed by the Combined Wastewater Collection and Treatment System (CWCTS) operated by the City of Sacramento. The CWCTS discharge is governed by Waste Discharge Requirements Order No. 2010-0004 issued to the City of Sacramento. Depending on treatment and conveyance capacity, flow in excess of 60 mgd maybe received at the Facility.

A. Description of Wastewater and Biosolids Treatment or Controls

The Facility is staffed and operated 24 hours per day and consists of influent pumps, septage receiving station, mechanical bar screening; aerated grit handling, grit classifiers that wash and dewater grit, covered primary sedimentation tanks, pure oxygen biological treatment by activated sludge, secondary sedimentation, disinfection with chlorine gas, and dechlorination with sulfur dioxide. Effluent can be diverted to lined and unlined emergency storage basins as needed to meet effluent dilution, thermal, and disinfection requirements or divert excess flows. Odors are controlled through stripping towers and carbon treatment.

Solids are thickened by dissolved air floatation and gravity belt thickeners. Primary and secondary sludge is mixed and sent to anaerobic digesters for approximately fifteen days or more, stored at the solids storage basins for three to five years then harvested and injected into lined dedicated land disposal sites. Some biosolids are recycled with the Synagro Organic Fertilizer Company and the Discharger can dispose of biosolids at the Keifer Landfill as an emergency disposal option. Separate Waste Discharge Requirements (Order No. R5-2003-0076) in conformance with Title 27, California Code of Regulations, Division 2, Subdivision 1 regulate the biosolids and solids storage and disposal facilities, the Class II dedicated land treatment units, unclassified solids storage basins, the Class III grit and screenings landfill closure and the groundwater Corrective Action Program (CAP).

The Facility discharges to the Sacramento River just downstream of the Freeport Bridge via an outfall diffuser. The outfall diffuser is approximately 300 feet long with 74 ports and is placed perpendicular to the river flow. At times, the river flows in the reverse direction northeast towards the City of Sacramento, due to tidal activity during low river flows. The Discharger diverts its discharge to emergency storage basins whenever these conditions exist. The Discharger has determined in studies that River flows of at least 1,300 cubic feet per second (cfs) and providing a flow ratio of at least 14 to 1 (river:effluent) are required to allow for adequate mixing of the effluent through the outfall diffuser.

The current average dry weather flows are approximately 141 mgd and the Facility has a designed capacity of 181 mgd. The Discharger prepared a "Sacramento Regional Wastewater Treatment Plant Capacity Rating Study" by Carollo Engineers, February 2005, which concluded the overall capacity for the treatment plant is approximately 207 mgd. The Discharger proposed to expand the treatment plant capacity to 218 mgd as described in the "Draft Environmental Impact Report (EIR) for the Sacramento Regional County Sanitation District – Sacramento Regional Wastewater Treatment Plant 2020 Master Plan", August 2003 and the Responses to Comments and Additional Information Sacramento Regional County Sanitation District – Sacramento Regional Wastewater Treatment Plant 2020 Master Plan", 21 May 2004. However, the EIR was successfully challenged by the Contra Costa Water District and is described in Case No. 05CS00908, Superior Court of California, County of Sacramento, dated 28 November 2007 under Judge Raymond Cadei. Oral arguments are expected late in 2010. The California Environmental Quality Act (CEQA) requirements will not be completed until the case is resolved.

On 11 June 2010, the Discharger withdrew its proposal for increasing the SRWTP capacity from 181 mgd to 218 mgd. The Discharger cited slow growth and potential reclamation as the reasons not to expand the wastewater treatment plant at this time.

B. Discharge Points and Receiving Waters

1. The Facility is located in Section 19, T7N, R5E, MDB&M, as shown in Attachment B, a part of this Order.

2. Treated municipal wastewater is discharged at Discharge Point No. 001 to Sacramento River, a water of the United States and within the legal boundary of the Sacramento-San Joaquin Delta at a point latitude 38° 27' 15" N and longitude 121° 30' 00" W.

3. The Facility and the Discharge Point are located near the community of Freeport outside the City of Sacramento and within the Sacramento River Watershed.

C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

Effluent limitations and Discharge Specifications contained in Order No. 5-00-188 for discharges from Discharge Point No. 001 and representative monitoring data from the term of Order No. Order No. 5-00-188 are as follows:

Table F-2. Historic Effluent Limitations and Monitoring Data

Parameter	Units	Effluent Limitation			Monitoring Data (From June 2005 – July 2008)[a]		
		Average Monthly	Average Weekly	Average Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge
Biochemical Oxygen Demand (5-day @ 20°C)	mg/L	30	45	60	11.1	13	28
	lbs/day[1,2]	45,286	67,929	90,572	13,136	16,336	31,283
		98,078	147,118	196,157			
Total Suspended Solids	mg/L	30	45	90	11	15	25
	lbs/day[1,2]	45,286	67,929	90,572	12,266	17,219	37,232
		98,078	147,118	196,157			
Settleable Solids	mL/L	0.1	--	0.5[3]	0.0	--	2.5
Total Coliform Organisms	MPN/100 mL	--	23 median	500[4]	--	30	500
Oil & Grease	mg/L	10	--	--	<5.5	--	
Lead	µg/L	--	--	(5.1)[5] 7.8	--	--	1.19
	lbs/day[1,2]	--	--	12	--	--	1.3
		--	--	26	--	--	
Silver	µg/L	--	--	(0.57)[5] 0.72	--	--	0.149
	lbs/day[1,2]	--	--	1.1			0.175
		--	--	2.3	--	--	
Mercury	lbs/year	5.1[6]	--	--	--	--	2.49
Copper	µg/L	--	--	(9.7)[5] 22.8	--	--	6.34
	lbs/day[1,2]	--	--	34	--	--	9.9
		--	--	75	--	--	
Cyanide	µg/L	--	--	(6.1)[5] 10.8	--	--	10
	lbs/day[1,2]	--	--	16	--	--	10.9
		--	--	35	--	--	

Parameter	Units	Effluent Limitation			Monitoring Data (From June 2005 – July 2008)[a]		
		Average Monthly	Average Weekly	Average Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge
Zinc	µg/L	--	--	(46.7)[5] 69.8	--	--	33.5
	lbs/day[1,2]	--	--	105	--	--	37
		--	--	228	--	--	
Bromodichloromethane	µg/L	3.6	--	7.2	--	--	3.4
	lbs/day[1,2]	5.4	--	11	--	--	2.7
		12	--	24	--	--	
Lindane (lbs/yr)	µg/L		--	ND[3]	--	--	<0.003
	lbs/year	19.6[6]	--		--	--	1.29
Methylene chloride	µg/L	14.3	--	32.1	--	--	5.4
	lbs/day[1,2]	22	--	48	--	--	6.4
		47	--	105	--	--	
Chloroform	µg/L	37.3	--	55.3	--	--	51
	lbs/day[1,2]	56	--	83			61.5
		122	--	181			
Chlorine, Total Residual	mg/L	0.011	--	0.018	--	--	0.07
	lbs/day[1,2]	17	--	27	--	--	82
		36	--	59	--	--	
Tetrachloroethylene	µg/L	14.1	--	35.6	--	--	0.9
Bis-2 (ethylhexyl) phthalate	µg/L	8.6	--	19.1	--	--	8.1
	lbs/day[1,2]	13	--	29	--	--	9.7
		28	--	62	--	--	
pH	standard units	--	--	6.0 – 7.5[7]	--	--	6 – 7.5
Average Dry Weather Flow	MGD	181	--	--	147	--	--
Peak Wet Weather Flow	MGD	392	--	--	179	--	345
Acute Toxicity	% Survival		[8]	--	--	--	50% (lowest)
Temperature	°F		[9]	--	--	--	23 over natural receiving water

Parameter	Units	Effluent Limitation			Monitoring Data (From June 2005 – July 2008)[a]		
		Average Monthly	Average Weekly	Average Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge

1 Based on average dry weather flow capacity of 181 mgd, applicable from May through October
2 Based on peak weather flow capacity of 392 mgd, applicable from November through April.
3 Daily Maximum.
4 Daily Maximum limit shall not be exceeded in any two (2) consecutive days.
5 (Trigger) and interim limits. Exceedance of the trigger concentration is a not violation, but when exceeded requires immediate investigation and action plan. Trigger concentration are not subsequently expressed as mass limits. Interim limits were pending additional studies, however final limits were never established under Order No. 5-00-188.
6 Based on lbs/year.
7 The discharge shall not have a pH value of less than 6.0 nor greater than 8.5 as calculated by a running 20-minute average of continuously monitored effluent pH nor have a pH value greater than 7.5 as calculated by a running 1-hour average of continuously monitored effluent pH. As discussed in Finding 23 and 24 the upper limit of 7.5 as 1-hour average is an interim limit until completion of further studies at which time its necessity will be reassessed.
8 Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:
Minimum for any one bioassay-------------------------------- 70%
Median for any three or more consecutive bioassays ----- 90%
9 The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than 25°F from 1 October through 30 April or by more than 20°F from 1 May through 30 September.

D. Compliance Summary

Year:	2005	2006	2007	2008	2009
Chlorine Residual	2	0	1	0	0
Minimum Dilution	0	1	0	0	0
Total Coliform Organisms	0	0	1	0	0
Acute Aquatic Toxicity	0	0	0	6	9
Settleable Solids	0	0	0	1	0

E. Planned Changes – Not Applicable

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the applicable plans, policies, and regulations identified in the Findings in section II of this Order. The applicable plans, policies, and regulations relevant to the discharge include the following:

A. Legal Authorities

This Order is issued pursuant to regulations in the Clean Water Act (CWA) and the California Water Code (CWC) as specified in the Finding contained at section II.C of this Order.

B. California Environmental Quality Act (CEQA)

This Order meets the requirements of CEQA as specified in the Finding contained at section II.E of this Order.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** This Order implements the following water quality control plans as specified in the Finding contained at section II.H of this Order.

   a. *Water Quality Control Plan, Fourth Edition* (Revised February 2007), *for the Sacramento and San Joaquin River Basin* (Basin Plan).

   b. Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan)

   c. Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California (Thermal Plan)

   For purposes of the Thermal Plan, the Discharger is considered to be an Existing Discharger of Elevated Temperature Waste. The Thermal Plan in section 5.A. contains the following temperature objectives for surface waters that are applicable to this discharge:

   "*5. Estuaries*
   A. Existing discharges
   (1) Elevated temperature waste discharges shall comply with the following:
   a. The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F.
   b. Elevated temperature waste discharges either individually or *combined with other discharges shall not create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.*
   c. No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.
   d. Additional limitations shall be imposed when necessary to assure protection of beneficial uses.

The Regional Water Board, on 26 May 1989, adopted Resolution No. 89-094 granting an exception to objectives 5A(l)(a) (from 1 October to 30 April) and 5A(l)(b) of the Thermal Plan. Additionally, Resolution 89-094 requires that the temperature of the discharge shall not exceed the natural receiving water temperature by more than 25°F from 1 October through 30 April. The State Water Board, on 20 September 1990, adopted Resolution No. 90-103 approving and modifying Central Valley Water Board Resolution No.89-094. State Water Board Resolution No. 90-103 approved the exception to objective 5A(1)(a), but not the one to 5A(1)(b). It further required a study of the feasibility of meeting the existing objective,5A(l)(b). The Discharger submitted the required study in a report in October 1991, with supplements in November and December 1991. Based on the study, the State Water Board adopted Resolution No. 92-82 on 22 October 1992, granting the Discharger an exception to objective 5A(l)(b). Specifically, the exception allows a maximum increase of 2 °F in a zone that does not exceed 25 percent of the cross sectional area of the main river channel at any point. The exception also limited any excursion of objective 5A(l)(b) to no more than one hour per day as an average in any thirty-day period when the upstream temperature of the Sacramento River is 65 °F or greater. This exception was carried over in Waste Discharge Order No. 5-00-188.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** This Order implements the NTR and CTR as specified in the Finding contained at section II.I of this Order.

3. **State Implementation Policy (SIP).** This Order implements the SIP as specified in the Finding contained at section II.I of this Order.

4. **Alaska Rule.** This Order is consistent with the Alaska Rule as specified in the Finding contained at section II.L of this Order.

5. **Antidegradation Policy.** As specified in the Finding contained at section II.N of this Order and as discussed in detail in the Fact Sheet (Attachment F, Section IV.D.4.), the discharge is consistent with the antidegradation provisions of 40 CFR section 131.12 and State Water Resources Control Board (State Water Board) Resolution 68-16.

6. **Anti-Backsliding Requirements.** This Order is consistent with anti-backsliding policies as specified in the Finding contained at section II.M of this Order. Compliance with the anti-backsliding requirements is discussed in the Fact Sheet (Attachment F, Section IV.D.3).

7. **Emergency Planning and Community Right to Know Act**

Section 13263.6(a) of the CWC, requires that "*the Regional Water Board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the* *state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRA) indicate as discharged into the POTW, for which the State Water Board or the Regional Water Board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective*".

The most recent toxic chemical data report indicates all reportable off-site releases or discharges to the collection system for this Facility were included in the effluent database. Off-site discharges included chromium and chromium compounds, copper and copper compounds, lead and lead compounds, styrene and zinc compounds. Therefore, a reasonable potential analysis based on information from EPCRA includes the data in the effluent database. Based on information from EPCRA, there is no additional reasonable potential to cause or contribute to an excursion above any numeric water quality objectives included within the Basin Plan or in any State Water Board plan, so no effluent limitations are included in this permit pursuant to CWC section 13263.6(a).

However, as detailed elsewhere in this Order, available effluent data indicate that there are constituents present in the effluent that have a reasonable potential to cause or contribute to exceedances of water quality standards and require inclusion of effluent limitations based on federal and state laws and regulations.

8. **Storm Water Requirements.** USEPA promulgated federal regulations for storm water on 16 November 1990 in 40 CFR Parts 122, 123, and 124. The NPDES Industrial Storm Water Program regulates storm water discharges from wastewater treatment facilities. Wastewater treatment plants are applicable industries under the storm water program and are obligated to comply with the federal regulations. The Discharger captures all storm water from the process areas, chemical storage facilities, administration and maintenance buildings, parking lots, undeveloped drainage areas immediately surrounding the Facilities and the Cogeneration/Ice Plant. All collected stormwater is conveyed to the stormwater pump station and is pumped to the headworks. Once or twice a year, during heavy storms, stormwater is discharged to Laguna Creek when the pumping capacity to the headworks is exceeded. This discharge is covered under the general Waste Discharge Order No. 97-03-DWQ.

9. **Endangered Species Act.** This Order is consistent with the Endangered Species Act as specified in the Finding contained at section II.P of this Order.

D. Impaired Water Bodies on CWA 303(d) List

1. Under section 303(d) of the 1972 CWA, states, territories and authorized tribes are required to develop lists of water quality limited segments. The waters on these lists do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. On

30 November 2006 USEPA gave final approval to California's 2006 section 303(d) List of Water Quality Limited Segments. The Basin Plan references this list of Water Quality Limited Segments (WQLSs), which are defined as "*…those sections of lakes, streams, rivers or other fresh water bodies where water quality does not meet (or is not expected to meet) water quality standards even after the application of appropriate limitations for point sources* (40 CFR Part 130, et seq.)." The Basin Plan also states, "*Additional treatment beyond minimum federal standards will be imposed on dischargers to [WQLSs]. Dischargers will be assigned or allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment.*" The listing for the Sacramento-San Joaquin Delta includes: Chlorpyrifos, DDT, Diazinon, Exotic Species, Group A Pesticides, Mercury, Polychlorinated byphenyls (PCBs) and unknown toxicity.

2. **Total Maximum Daily Loads (TMDLs).** USEPA requires the Central Valley Water Board to develop TMDLs for each 303(d) listed pollutant and water body combination.

Table F-3. TMDLs in Delta

Pollutant	Potential Sources	Proposed TMDL Completion
Chlorpryrifos	Agriculture, Urban Runoff/Strom Sewers	Completed
DDT	Agriculture	2011
Diazinon	Agriculture, Urban Runoff/Stormwater Sewers	Completed
Exotic Species	Source Unknown	2019
Group A Pesticides	Agriculture	2011
Mercury	Resource Extraction	Phase I completed
PCBs (Polychlorinated biphenyls)	Source Unknown	2019
Unknown Toxicity	Source Unknown	2019

The 303(d) listings and TMDLs have been considered in the development of the Order. A pollutant-by-pollutant evaluation of each pollutant of concern is described in section IV.C.3. of this Fact Sheet.

E. Other Plans, Polices and Regulations

Title 27, California Code of Regulations (CCR), section 20005 et seq. (hereafter Title 27) Title 27 regulations contains the State Water Resources Control Board's water quality regulations for discharges of solid wastes to land. Exemption from Title 27 is provided if the discharges of domestic sewage or treated effluent are regulated by WDRs and are consistent with applicable water quality objectives and treatment or storage facilities associated with municipal wastewater treatment plants, provided solid wastes are discharged only in accordance with Title 27. Historically discharges of wastewater to land, including but not limited to evaporation ponds or percolation ponds, storage ponds have been exempt from the requirements of Title 27, CCR, based on section 20090 et seq. However, the State Water Resources Control Board issued a decision on another municipal wastewater treatment plant, the City of Lodi, that storage basins must be part of the treatment process in order to be included in the Title 27 exemptions.

The Facility contains solids storage, land disposal and emergency influent and effluent storage. A determination has been made by the Central Valley Water Board whether the facilities meet the exemptions from Title 27. These facilities include the Solid Storage Basins (SSBs) and Dedicated Land Disposal areas (DLDs) and Emergency Storage Basins. The Central Valley Water Board's findings regarding Title 27 exemptions are discussed below.

1. **Solids Storage Basins (SSBs).** The SSBs are unlined storage ponds for anaerobically digested primary and secondary sludge and scum. The SSBs receive about 6,000 tons of wet sludge per day. The digested sludge has about 0.4 to 3% solids and is composed of 50 to 80% volatile solids. Digested sludge may also contain variable concentrations of contaminants such as heavy metals, chlorinated hydrocarbons and pathogens. The sludge remains in the basins from three to five years prior to discharge to the DLDs. The SSBs provide additional stabilization treatment, storage and evaporation of the sludge. The EIR states that settled sludge has created a barrier to groundwater similar to being lined. In July 2009, the District installed six new wells to monitor groundwater water quality. The results from those wells will determine if the SSBs are impacting groundwater and need to be lined. The SSBs are governed by Order No. R5-2003-0076, Sacramento Regional County Sanitation District Biosolids and Solids Storage and Disposal Facilities. Order No. R5-2003-0076 is scheduled to be renewed in 2013.

2. **Dedicated Land Disposal Areas (DLDs).** The DLDs are lined land disposal units that receive stabilized sludge from the SSBs. The semi-liquid sludge is applied to the DLDs by subsurface injection during dry seasons. To prevent leaching of heavy metals, the District applies lime to maintain proper soil pH. The DLDs are not exempt from Title 27 and are governed by Order No. R5-2003-0076, Sacramento Regional County Sanitation District Biosolids and Solids Storage and Disposal Facilities.

3. **Corrective Action Program (CAP).** During the 1990's the groundwater beneath the DLDs were found to be impacted by elevated concentrations of nitrates, chlorides and total dissolved solids (TDS). To mitigate the impacted groundwater, the Class III landfill that took grit and screenings was closed and the DLDs were either lined or closed. The District implemented a Corrective Action Program in December 1995 to remediate the impacted groundwater and it consisted of extraction wells down gradient of the DLDs. The extraction wells keep the groundwater from migrating off the Facility site. The groundwater is discharged downstream of the secondary clarifiers of the WWTP where it continues through the remaining treatment processes and discharged to the Sacramento River or to the onsite constructed wetlands. The CAP is operational and is regulated under Order No. R5-2003-0076, Sacramento Regional County Sanitation District Biosolids and Solids Storage and Disposal Facilities

4. **Emergency Storage Basins (ESBs).** The Facility includes five Emergency Storage Basins (ESBs), ESB-A through E with a total capacity of 302 million gallons (MG). ESB-A is lined with concrete and has 15.5 MG of capacity. The purpose of ESB-A is to store diverted influent flows above the SRWTP hydraulic capacity (peak wet weather flows) and store diverted effluent flows to meet various conditions to comply with the NPDES permit. Reasons to divert final effluent to ESB-A and not discharge to the Sacramento River include maintaining the minimum 14:1 river to effluent ratio, maintaining effluent temperature requirements, and maintaining chlorine limits. Flow stored in ESB-A is returned to the SRWTP headworks for treatment. Overflow from ESB-A discharges to unlined ESB-B that can if necessary overflow to unlined ESB-C. The combined capacity of ESB-B and C is 206 MG. Since construction of ESB-D, ESB-A is typically only used to store excess influent flows. ESB-A, B and C are exempt from Title 27, § 20090(a) since these basins are integral to protecting the SRWTP treatment processes from washing out due to peak wet weather flows or for storage of diverted flow to comply NPDES permit conditions.

   ESB-D is lined with 60-mil reinforced polypropylene liner and has a capacity of 60-75 MG. The primary use of ESB-D is to store diverted chlorinated effluent to comply with flow dilution, potential chlorine excursions and thermal requirements. Chlorinated effluent from ESB-D is returned to the SRWTP for dechlorination prior to discharge to the Sacramento River. Since ESB-D is lined there is minimal threat to groundwater and is consistent with water quality objectives and therefore is exempt from Title 27 § 20090(a).

   ESB-E is part of the surge relief mechanism and designed to relieve water hammer effects in the influent conduit. ESB-E stores raw influent in an unlined earthen 20 MG basin and is exempt from Title 27 § 20090(a).

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

Effluent limitations and toxic and pretreatment effluent standards established pursuant to sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304

(Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the CWA and amendments thereto are applicable to the discharge.

The CWA mandates the implementation of effluent limitations that are as stringent as 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 incorporate discharge limits necessary to ensure that water quality standards are met. This requirement applies to narrative criteria as well as to criteria specifying maximum amounts of particular pollutants. Pursuant to federal regulations, 40 CFR 122.44(d)(1)(i), NPDES permits must contain limits 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.*" Federal regulations, 40 CFR 122.44(d)(1)(vi), further provide that "[w]*here a state has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits.*"

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the Code of Federal Regulations: 40 CFR 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR 122.44(d) requires that permits include WQBELs to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water where numeric water quality objectives have not been established. The Basin Plan at page IV-17.00, contains an implementation policy, "*Policy for Application of Water Quality Objectives*", that specifies that the Regional Water Board "*will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives.*" This Policy complies with 40 CFR 122.44(d)(1). With respect to narrative objectives, the Regional Water Board must establish effluent limitations using one or more of three specified sources, including: (1) USEPA's published water quality criteria, (2) a proposed state criterion (i.e., water quality objective) or an explicit state policy interpreting its narrative water quality criteria (i.e., the Regional Water Board's "*Policy for Application of Water Quality Objectives*")(40 CFR 122.44(d)(1)(vi)(A), (B) or (C)), or (3) an indicator parameter.

The Basin Plan includes numeric site-specific water quality objectives and narrative objectives for toxicity, chemical constituents, discoloration, radionuclides, and tastes and odors. The narrative toxicity objective states: "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at III-8.00.) The Basin Plan states that material and relevant information, including numeric criteria, and recommendations from other agencies and scientific literature will be utilized in evaluating compliance with the narrative toxicity objective. The narrative chemical constituents objective states that waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At minimum, "*...water designated for use as domestic or municipal supply (MUN) shall not* *contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs)" in Title 22 of CCR.* The Basin Plan further states that, to protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs. The narrative tastes and odors objective states: *"Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses."*

A. Discharge Prohibitions

1. As stated in section I.G of Attachment D, Standard Provisions, this Order prohibits bypass from any portion of the treatment facility. Federal regulations, 40 CFR 122.41(m), define "bypass" as the intentional diversion of waste streams from any portion of a treatment facility. This section of the federal regulations, 40 CFR 122.41(m)(4), prohibits bypass unless it is unavoidable to prevent loss of life, personal injury, or severe property damage. In considering the Regional Water Board's prohibition of bypasses, the State Water Board adopted a precedential decision, Order No. WQO 2002-0015, which cites the federal regulations, 40 CFR 122.41(m), as allowing bypass only for essential maintenance to assure efficient operation.

2. Order No. 5-00-118 included the discharge prohibition of no discharge unless the river is flowing more than 1300 cfs and there is at least a 14 to 1 flow ratio (river:effluent). These conditions were based on previous studies that determined river flows of at least 1300 cfs and providing a flow ratio of at least 14 to 1 (river:effluent) are required to allow adequate mixing of the effluent. Although the diffuser configuration has changed from 99 ports to 74 ports and new dye studies confirmed the dynamic modeling showing mixing zones, all the recent analysis for the antidegradation, thermal plumes, dilution credits have been based on continuing these conditions. Therefore, these conditions remain in this Order.

B. Technology-Based Effluent Limitations

Scope and Authority

Section 301(b) of the CWA and implementing USEPA permit regulations at 40 CFR 122.44 require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 CFR Part 133.

Regulations promulgated in 40 CFR 125.3(a)(1) require technology-based effluent limitations for municipal Dischargers to be placed in NPDES permits based on Secondary Treatment Standards or Equivalent to Secondary Treatment Standards.

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) established the minimum performance requirements for POTWs [defined in section

304(d)(1)]. Section 301(b)(1)(B) of that Act requires that such treatment works must, as a minimum, meet effluent limitations based on secondary treatment as defined by the USEPA Administrator.

Based on this statutory requirement, USEPA developed secondary treatment regulations, which are specified in 40 CFR Part 133. These technology-based regulations apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH.

Applicable Technology-Based Effluent Limitations

a. **BOD_5 and TSS.** Federal regulations, 40 CFR Part 133, establish the minimum weekly and monthly average level of effluent quality attainable by secondary treatment for BOD_5 and TSS. However, as described in section IV.C.3.c.xi, this Order requires water quality-based effluent limitations (WQBELs) more stringent than the applicable technology-based effluent limitations which are based on tertiary treatment, which is necessary to protect the beneficial uses of the receiving stream. Effluent limitations prescribed by this Order are equal to or are more stringent than the Technology-Based Effluent Limits for BOD_5, TSS and pH. In addition, 40 CFR 133.102, in describing the minimum level of effluent quality attainable by secondary treatment, states that the 30-day average percent removal shall not be less than 85 percent. This Order contains a limitation requiring an average of 85 percent removal of BOD_5 and TSS over each calendar month.

b. **Flow.** The Facility was designed to provide a secondary level of treatment for up to a design flow of 181 mgd. Therefore, this Order contains an average dry weather discharge flow effluent limit of 181 mgd.

c. **pH.** The secondary treatment regulations at 40 CFR Part 133 also require that pH be maintained between 6.0 and 9.0 standard units.

Summary of Technology-based Effluent Limitations
Discharge Point No. 001

Table F-4. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
BOD 5-day @ 20°C	mg/L	30	45	60	--	--
Total Suspended Solids	mg/L	30	45	60	--	--
PH	Standard Units	--	--	--	6.0	9.0
85% Removal of BOD 5-day @ 20°C and Total Suspended Solids						

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

Section 301(b) of the CWA and 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. This Order contains requirements, expressed as a technology equivalence requirement, more stringent than secondary treatment requirements that are necessary to meet applicable water quality standards. The rationale for these requirements, which consist of tertiary treatment or equivalent requirements and other provisions, is discussed in section IV.C.3 of this Fact Sheet.

40 CFR 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBELs must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply.

The Basin Plan on page II-1.00 states: "*Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning…*" and with respect to disposal of wastewaters states that "*...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses.*"

The federal CWA section 101(a)(2), states: "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and for recreation in and on the water be achieved by July 1, 1983." Federal Regulations, developed to implement the requirements of the CWA, create a rebuttable presumption that all waters be designated as fishable and swimmable. Federal Regulations, 40 CFR sections 131.2 and 131.10, require that all waters of the State regulated to protect the beneficial uses of public water supply, protection and propagation of fish, shell fish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation. Section 131.3(e), 40 CFR, defines existing beneficial uses as those uses actually attained after 28 November 1975, whether or not they are included in the water quality standards. Federal Regulation, 40 CFR section 131.10 requires that uses be obtained by implementing effluent limitations, requires that all downstream uses be protected and states that in no case shall a state adopt waste transport or waste assimilation as a beneficial use for any waters of the United States.

a. **Receiving Water and Beneficial Uses.** Beneficial uses applicable to Sacramento-San Joaquin Delta are as follows:

Table F-5. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	**Sacramento – San Joaquin Delta**	<u>Existing:</u> Municipal and domestic supply (MUN); Agricultural supply, including irrigation and stock watering (AGR); Industrial process supply (PROC); Industrial service supply (IND); Water contact recreation, including canoeing and rafting (REC-1); Non-contact water recreation (REC-2); Warm freshwater habitat (WARM); Cold freshwater habitat (COLD); Migration of aquatic organisms, warm and cold (MIGR); Spawning, reproduction, and/or early development, warm (SPWN); Wildlife habitat (WILD); and Navigation (NAV).
NA	**Groundwater**	Municipal and domestic water supply (MUN); Agricultural supply (AGR); Industrial service supply (IND), and Industrial process supply (PRO).

The Delta is vital to California and comprises over 700 miles of interconnected waterways and encompasses 1,153 square miles. The Delta is home to over two hundred eighty species of birds and more than fifty species of fish, making it one of the most ecologically important aquatic habitats in the State. Drinking water for over 25 million Californians is pumped from the Delta via the State Water Project, Central Valley Water Project, and local water intakes. The Delta supports California's trillion dollar economy with $27 billion annually for agriculture. Additionally, the Delta has 12 million user-days for recreation each year.

b. **Effluent and Ambient Background Data.** The reasonable potential analysis (RPA), as described in section IV.C.3 of this Fact Sheet, was based on effluent data from 1 June 2005 through 30 July 2008 effluent and ambient background data from 1 January 1998 through 30 July 2008 submitted in SMRs, the Report of Waste Discharge (ROWD), the Pretreatment Program Annual Reports and the Coordinated Monitoring Program. Additional data outside of this range was also analyzed where there was inadequate data to perform an analysis. Effluent and ambient data for iron and manganese was collected in 2009 because this data was not included in the other databases described above. The Discharger collected effluent and receiving water dioxin and furan data in 2002 and 2004 and are included under a technical memorandum SRWTP 13267 Dioxin Data.

c. **Priority Pollutant Metals**

i. **Hardness Dependent CTR Metals Criteria.** The *California Toxics Rule* and the *National Toxics Rule* contain water quality criteria for seven metals that vary as a function of hardness. The lower the hardness the lower the water quality criteria. The metals with hardness-dependent criteria include cadmium, copper, chromium III, lead, nickel, silver, and zinc.

This Order has established the criteria for hardness-dependent metals based on the reasonable worst-case ambient hardness as required by the SIP[1], the CTR[2] and State Water Board Order No. WQO 2008-0008 (City of Davis). The SIP and the CTR require the use of "receiving water" or "actual ambient" hardness, respectively, to determine effluent limitations for these metals. (SIP, § 1.2; 40 CFR § 131.38(c)(4), Table 4, note 4.) The CTR does not define whether the term "ambient," as applied in the regulations, necessarily requires the consideration of upstream as opposed to downstream hardness conditions. Therefore, where reliable, representative data are available, the hardness value for calculating criteria can be the downstream receiving water hardness, after mixing with the effluent (Order WQO 2008-0008, p. 11). The Central Valley Water Board thus has considerable discretion in determining ambient hardness (*Id.*, p.10.).

The hardness values must also be protective under all flow conditions (*Id.*, pp. 10-11). As discussed below, scientific literature provides a reliable method for calculating protective hardness-dependent CTR criteria,

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1 The SIP does not address how to determine the hardness for application to the equations for the protection of aquatic life when using hardness-dependent metals criteria. It simply states, in Section 1.2, that the criteria shall be properly adjusted for hardness using the hardness of the receiving water.

2 The CTR requires that, for waters with a hardness of 400 mg/L (as $CaCO_3$), or less, the actual ambient hardness of the surface water must be used. It further requires that the hardness values used must be consistent with the design discharge conditions for design flows and mixing zones.

considering all discharge conditions. This methodology produces criteria that ensure these metals do not cause receiving water toxicity, while avoiding criteria that are unnecessarily stringent.

(a) Reasonable Potential Analysis (RPA). The SIP in Section 1.3 states, "The RWQCB shall...determine whether a discharge may: (1) cause, (2) have a reasonable potential to cause, or (3) contribute to an excursion above any applicable priority pollutant criterion or objective." Section 1.3 provides a step-by-step procedure for conducting the RPA. The procedure requires the comparison of the Maximum Effluent Concentration (MEC) and Maximum Ambient Background Concentration to the applicable criterion that has been properly adjusted for hardness. Unless otherwise noted, for the hardness-dependent CTR metals criteria the following procedures were followed for properly adjusting the criterion for hardness when conducting the RPA.

- For comparing the MEC to the applicable criterion, in accordance with the SIP, CTR, and Order WQO 2008-0008, the reasonable worst-case downstream hardness was used to adjust the criterion. In this evaluation the portion of the receiving water affected by the discharge is analyzed. For hardness-dependent criteria, the hardness of the effluent has an impact on the determination of the applicable criterion in areas in the receiving water affected by the discharge. Therefore, for this situation it is necessary to consider the hardness of the effluent in determining the applicable hardness to adjust the criterion. The procedures for determining the applicable criterion after proper adjustment using the reasonable worst-case downstream hardness is outlined in subsection ii, below.

- For comparing the Maximum Ambient Background Concentration to the applicable criterion, in accordance with the SIP, CTR, and Order WQO 2008-0008, the reasonable worst-case upstream hardness was used to adjust the criterion. In this evaluation the area outside the influence of the discharge is analyzed. For this situation, the discharge does not impact the upstream hardness. Therefore, the effect of the effluent hardness was not included in this evaluation. Upstream receiving water hardness data for the Sacramento River ranged from 26 mg/L to 100 mg/L (as CaCO3), based on 100 samples from June 2005 to July 2008. The minimum observed upstream receiving water hardness, 26 mg/L as $CaCO_3$, was used to adjust the CTR criteria when comparing Maximum Background Ambient Concentration to the criterion.

(b) Effluent Concentration Allowances (ECA) Calculations. A 2006 Study[1] developed procedures for calculating the effluent concentration allowance (ECA)[2] for CTR hardness-dependent metals. The 2006 Study demonstrated that it is necessary to evaluate all discharge conditions (e.g. high and low flow conditions) and the hardness and metals concentrations of the effluent and receiving water when determining the appropriate ECA for these hardness-dependent metals. Simply using the lowest recorded upstream receiving water hardness to calculate the ECA may result in over or under protective water quality-based effluent limitations.

The equation describing the total recoverable regulatory criterion, as established in the CTR, is as follows:

CTR Criterion = WER x $(e^{m[\ln(H)]+b})$(Equation 1)

Where:

H = hardness (as $CaCO_3$)
WER = water-effect ratio
m, b = metal- and criterion-specific constants

In accordance with the CTR, the default value for the WER is 1. A WER study must be conducted to use a value other than 1. The constants "m" and "b" are specific to both the metal under consideration, and the type of total recoverable criterion (i.e., acute or chronic). The metal-specific values for these constants are provided in the CTR at paragraph (b)(2), Table 1.

The equation for the ECA is defined in Section 1.4, Step 2, of the SIP and is as follows:

ECA = C (when $C \leq B$)[3] (Equation 2)

Where

C = the priority pollutant criterion/objective, adjusted for hardness (see Equation 1, above)
B = the ambient background concentration

The 2006 Study demonstrated that the relationship between hardness and the calculated criteria is the same for some metals, so the same procedure for calculating the ECA may be used for these metals. The

[1] Emerick, R.W.; Borroum, Y.; & Pedri, J.E., 2006. California and National Toxics Rule Implementation and Development of Protective Hardness Based Metal Effluent Limitations. WEFTEC, Chicago, Ill.
[2] The ECA is defined in Appendix 1 of the SIP (page Appendix 1-2). The ECA is used to calculate water quality-based effluent limitations in accordance with Section 1.4 of the SIP.
[3] The 2006 Study assumes the ambient background metals concentration is equal to the CTR criterion (i.e. $C \leq B$)

same procedure can be used for chronic cadmium, chromium III, copper, nickel, and zinc. These metals are hereinafter referred to as "Concave Down Metals". "Concave Down" refers to the shape of the curve represented by the relationship between hardness and the CTR criteria in Equation 1. Another similar procedure can be used for determining the ECA for acute cadmium, lead, and acute silver, which are referred to hereafter as "Concave Up Metals".

ECA for Concave Down Metals – For Concave Down Metals (i.e., chronic cadmium, chromium III, copper, nickel, and zinc) the 2006 Study demonstrates that when the effluent is in compliance with the CTR criteria and the upstream receiving water is in compliance with the CTR criteria, any mixture of the effluent and receiving water will always be in compliance with the CTR criteria. Therefore, based on any observed ambient background hardness, no receiving water assimilative capacity for metals (i.e., ambient background metals concentrations are at their respective CTR criterion) and the minimum effluent hardness, the ECA calculated using Equation 1 with a hardness equivalent to the minimum effluent hardness is protective under all discharge conditions (i.e., high and low dilution conditions and under all mixtures of effluent and receiving water as the effluent mixes with the receiving water). This is applicable whether the effluent hardness is less than or greater than the ambient background receiving water hardness.

The effluent hardness ranged from 80 mg/L to 150 mg/L (as CaCO3), based on 216 samples from June 2005 to July 2008. The upstream receiving water hardness varied from 26 mg/L to 100 mg/L (as CaCO3), based on 100 samples from June 2005 to July 2008. Using a hardness of 80 mg/L (as $CaCO_3$) to calculate the ECA for all Concave Down Metals will result in water quality-based effluent limitations that are protective under all potential effluent/receiving water mixing scenarios and under all known hardness conditions, as demonstrated in the example using copper shown in Table F-6, below. This example assumes the following conservative conditions for the upstream receiving water:

- Upstream receiving water always at the lowest observed upstream receiving water hardness (i.e., 26 mg/L as $CaCO_3$).
- Upstream receiving water copper concentration always at the CTR criteria (i.e., no assimilative capacity). Based on available data, the receiving water never exceeded the CTR criteria for any metal with hardness-dependent criteria.

As demonstrated in Table F-6, using a hardness of 80 mg/L (as $CaCO_3$) to calculate the ECA for Concave Down Metals ensures the discharge is protective under all discharge and mixing conditions. In this example, the effluent is in compliance with the CTR criteria and any mixture of the effluent and receiving water is in compliance with the CTR criteria. An

ECA based on a lower hardness (e.g. lowest upstream receiving water hardness) would also be protective, but would result in unreasonably stringent effluent limits considering the known conditions. Therefore, in this Order the ECA for all Concave Down Metals has been calculated using Equation 1 with a hardness of 80 mg/L (as $CaCO_3$).Table F-6.

Table F-6. Copper ECA Evaluation

Minimum Observed Effluent Hardness			80 mg/L (as $CaCO_3$)
Minimum Observed Upstream Receiving Water Hardness			26 mg/L (as $CaCO_3$)
Maximum Assumed Dissolved Upstream Receiving Water Copper Concentration			3.0 µg/L[1]
Dissolved Copper $ECA_{chronic}$[2]			7.7 µg/L
Effluent Fraction	**Mixed Downstream Ambient Concentration**		
	Hardness[3] **(mg/L)** (as $CaCO_3$)	**CTR Criteria**[4] **(µg/L)**	**Copper**[5] **(µg/L)**
1%	26.5	3.0	3.0
5%	28.7	3.2	3.2
15%	34.1	3.7	3.7
25%	39.5	4.2	4.1
50%	53	5.4	5.3
75%	66.5	6.6	6.5
100%	80	7.7	7.7

1 Maximum assumed upstream receiving water dissolved copper concentration calculated using Equation 1 for chronic criterion at a hardness of 26 mg/L (as $CaCO_3$).

2 Dissolved ECA calculated using Equation 1 for chronic criterion at a hardness of 80 mg/L (as $CaCO_3$).

3 Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.

4 Mixed downstream ambient criteria (as dissolved) are the chronic criteria calculated using Equation 1 at the mixed hardness.

5 Mixed downstream ambient copper concentration (dissolved) is the mixture of the receiving water and effluent dissolved copper concentrations at the applicable effluent fraction.

ECA for Concave Up Metals - For Concave Up Metals (i.e., acute cadmium, lead, and acute silver), the 2006 Study demonstrates that due to a different relationship between hardness and the metals criteria, the effluent and upstream receiving water can be in compliance with the CTR criteria, but the resulting mixture may be out of compliance. Therefore, the 2006 Study provides a mathematical approach to calculate the ECA to ensure that any mixture of effluent and receiving water is in compliance with the CTR criteria (see Equation 3, below). The ECA, as calculated using Equation 3, is based on the reasonable worst-case ambient background hardness, no receiving water assimilative capacity for metals (i.e., ambient background metals concentrations are at their respective CTR criterion), and the minimum observed effluent hardness. The reasonable worst-case ambient background hardness depends on whether the effluent hardness is greater than or less than the upstream receiving water hardness. There are circumstances where the conservative ambient background hardness assumption is to assume that the upstream receiving water is at the highest observed hardness concentration. The conservative upstream receiving water condition as used in the Equation 3 below is defined by the term H_{rw}.

$$ECA_{l} = \left(\frac{m(H_e - H_{rw})(e^{m\{\ln(H_{rw})\}+b})}{H_{rw}} \right) + e^{m\{\ln(H_{rw})\}+b} \qquad \text{(Equation 3)}$$

m, b = criterion specific constants (from CTR)

H_e = minimum observed effluent hardness

H_{rw} = minimum observed upstream receiving water hardness when the minimum effluent hardness is always greater than observed upstream receiving water hardness ($H_{rw} < H_e$)

-or-

maximum observed upstream receiving water hardness when the minimum effluent hardness is always less than observed upstream receiving water hardness ($H_{rw} > H_e$)[1]

A similar example as was done for the Concave Down Metals is shown for lead, a Concave Up Metal, in Tables F-6 and F-7, below. As previously mentioned, the minimum effluent hardness is 80 mg/L (as $CaCO_3$), while the upstream receiving water hardness ranged from 26 mg/L to 100 mg/L (as CaCO3), based on 100 samples from June 2005 to July 2008. In this case, the minimum effluent concentration is within the range of observed upstream receiving water hardness concentrations. Therefore, Equation 3 was used to calculate two ECAs, one based on the minimum observed upstream receiving water hardness and one based on the maximum observed upstream receiving water hardness. Using Equation 3, the lowest ECA results from using the minimum upstream receiving water hardness, the minimum effluent hardness, and assuming no receiving water assimilative capacity for lead (i.e., ambient background lead concentration is at the CTR chronic criterion).

[1] When the minimum effluent hardness falls within the range of observed receiving water hardness concentrations, Equation 3 is used to calculate two ECAs, one based on the minimum observed upstream receiving water hardness and one based on the maximum observed upstream receiving water hardness. The minimum of the two calculated ECAs represents the ECA that ensures any mixture of effluent and receiving water is in compliance with the CTR criteria.

Table F-7. Lead ECA Evaluation Using Minimum Receiving Water Hardness

Minimum Observed Effluent Hardness	80 mg/L (as $CaCO_3$)
Minimum Observed Upstream Receiving Water Hardness	26 mg/L (as $CaCO_3$)
Maximum Assumed Upstream Receiving Water Lead Concentration	0.57 µg/L[1]
Lead ECA_{acute}[2]	2.1 µg/L

Effluent Fraction	**Mixed Downstream Ambient Concentration**		
	Hardness[3] (mg/L) (as $CaCO_3$)	**CTR Criteria[4] (µg/L)**	**Lead[5] (µg/L)**
1%	26.5	0.6	0.6
5%	28.7	0.6	0.6
15%	34.1	0.8	0.8
25%	39.5	1.0	1.0
50%	53.0	1.4	1.3
75%	66.5	1.9	1.7
100%	80.0	2.4	2.1

1 Maximum assumed upstream receiving water lead concentration calculated using Equation 1 for acute criterion at a hardness of 26 mg/L (as $CaCO_3$).

2 ECA calculated using Equation 3 for chronic criteria.

3 Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.

4 Mixed downstream ambient criteria and the chronic criteria calculated using Equation 1 at the mixed hardness.

5 Mixed downstream ambient lead concentration is the mixture of the receiving water and effluent lead concentrations at the applicable effluent fraction.

Table F-8. Lead ECA Evaluation Using Maximum Receiving Water Hardness

Minimum Observed Effluent Hardness	80 mg/L (as $CaCO_3$)
Maximum Observed Upstream Receiving Water Hardness	100 mg/L (as $CaCO_3$)
Maximum Assumed Upstream Receiving Water Lead Concentration	3.2 µg/L[1]
Lead ECA_{acute}[2]	2.4 µg/L

Effluent Fraction	Mixed Downstream Ambient Concentration		
	Hardness[3] (mg/L) (as $CaCO_3$)	**CTR Criteria[4] (µg/L)**	**Lead[5] (µg/L)**
1%	99.8	3.2	3.2
5%	99.0	3.1	3.1
15%	97.0	3.1	3.1
25%	95.0	3.0	3.0
50%	90.0	2.8	2.8
75%	85.0	2.6	2.6
100%	80.0	2.4	2.4

1 Maximum assumed upstream receiving water lead concentration calculated using Equation 1 for chronic criterion at a hardness of 100 mg/L (as $CaCO_3$).

2 ECA calculated using Equation 3 for chronic criteria.

3 Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.

4 Mixed downstream ambient criteria and the acute criteria calculated using Equation 1 at the mixed hardness.

5 Mixed downstream ambient lead concentration is the mixture of the receiving water and effluent lead concentrations at the applicable effluent fraction.

Using Equation 3 to calculate the ECA for all Concave Up Metals will result in water quality-based effluent limitations that are protective under all potential effluent/receiving water mixing scenarios and under all known hardness conditions, as demonstrated in Tables F-6 and F-7, for lead. In this example, the effluent is in compliance with the CTR criteria and any mixture of the effluent and receiving water is in compliance with the CTR criteria. Use of a lower ECA (e.g., calculated based solely on the lowest upstream receiving water hardness) is also protective, but would lead to unreasonably stringent effluent limits considering the known conditions. Therefore, Equation 3 has been used to calculate the ECA for all Concave Up Metals in this Order.

Table F-9 summarizes the ECAs calculated for all hardness-dependant metals.

Table F-9. Summary of ECA Evaluations

Metals	Effluent Concentration Allowances, ECAs (ug/L) as total recoverable metals	
	acute	chronic
Copper	11	7.7
Chromium III	1500	72
Cadmium	3.3	2.1
Lead	54	2.1
Nickel	390	43
Silver	1.8	--
Zinc	99	99

ii. **Conversion Factors.** The CTR contains aquatic life criteria for arsenic, cadmium, chromium III, chromium VI, copper, lead, nickel, silver, and zinc which are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. The default USEPA conversion factors contained in Appendix 3 of the SIP were used to convert the applicable dissolved criteria to total recoverable criteria.

d. **Dilution Credits/Mixing Zones.** The SRCSD has requested mixing zones and dilution credits for compliance with acute and chronic aquatic life water quality criteria, and human carcinogen water quality criteria. The Central Valley Water Board has the discretion to accept or deny mixing zones and dilution credits. The CWA directs states to adopt water quality standards to protect the quality of its waters. USEPA's current water quality standards regulation authorizes states to adopt general policies, such as mixing zones, to implement state water quality standards (40 CFR section 122.44 and section 122.45). The USEPA allows states to have broad flexibility in designing its mixing zone policies. Primary policy and guidance on determining mixing zone and dilution credits is provided by the SIP and the Basin Plan. If no procedure applies in the SIP or the Basin Plan, then the Central Valley Water Board may use the USEPA Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) (TSD).

The TSD defines a mixing zone as follows, "*...a mixing zone is an area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented.*"[1] The SIP provides guidance on mixing zones and dilution credits in establishing water quality-based effluent limitations. Water quality criteria and objectives must be met throughout a water body except within

1 TSD, Glossary

a mixing zone. All mixing zones shall be as small as practicable and must meet specific conditions. The allowance of mixing zones by the Central Valley Water Board is discretionary and can be granted parameter-by-parameter and/or type of criteria (e.g., acute or chronic aquatic life criteria).

The allowance of mixing zones by the Central Valley Water Board is discussed in the Basin Plan, Policy for Application of Water Quality Objectives, which states in part, "*In conjunction with the issuance of NPDES and storm water permits, the Regional Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional 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. In determining the size of such mixing zones, the Regional Board will consider the applicable procedures and guidelines in the EPA's Water Quality Standards Handbook and the [TSD]. Pursuant to EPA guidelines, mixing zones designated for acute aquatic life objectives will generally be limited to a small zone of initial dilution in the immediate vicinity of the discharge.*"[1]

Section 1.4.2 of the SIP states, in part, "*...with the exception of effluent limitations derived from TMDLs, in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a basin plan, the Regional Board may grant mixing zones and dilution credits to dischargers ... The applicable priority pollutant criteria and objectives are to be met throughout a water body except within any mixing zone granted by the Regional Board. The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis. The Regional Board may consider allowing mixing zones and dilution credits only for discharges with a physically identifiable point of discharge that is regulated through an NPDES permit issued by the Regional Board.*"[2]

Both federal and state guidance include similar mixing zone conditions, the SIP conditions are as follows:

"*A mixing zone shall be as small as practicable. The following conditions must be met in allowing a mixing zone:*

A: A mixing zone shall not:

1. *compromise the integrity of the entire water body;*

1 Basin Plan, page IV-16.00
2 SIP, pg. 15

2. *cause acutely toxic conditions to aquatic life passing through the mixing zone;*

3. *restrict the passage of aquatic life;*

4. *adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;*

5. *produce undesirable or nuisance aquatic life;*

6. *result in floating debris, oil, or scum;*

7. *produce objectionable color, odor, taste, or turbidity;*

8. *cause objectionable bottom deposits;*

9. *cause nuisance;*

10. *dominate the receiving water body or overlap a mixing zone from different outfalls; or*

11. *be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water. To the extent of any conflict between this determination and the Sources of Drinking Water Policy (Resolution No. 88-63), this SIP supersedes the provisions of that policy."*[1]

The mixing zone is thus an administrative construct defined as an area around the outfall that may exceed water quality objectives, but is otherwise protective of the beneficial uses. Dilution is defined as the amount of mixing that has occurred at the edge of this mixing zone under critical conditions, thus protecting the beneficial uses at the concentration and for the duration and frequency required.

i. **Sacramento River Hydrology.** The lower Sacramento River in the vicinity of the discharge is a large river with sufficient flows for dilution. The Sacramento watershed is a heavily managed system of reservoirs and diversions. The Sacramento River near the discharge location (Freeport) drains a 26,146-square-mile basin that spans the entire northern Central Valley of California from the crest of the Coast Range to the crest of the Sierra Nevada. Flows in the Sacramento River are influenced by precipitation (rainfall and snowpack/snowmelt), but are also influenced by several reservoirs on the tributaries and main stem, which are managed for flood control, water supply, and hydroelectric power generation. Irrigation diversions and agricultural return flows also affect the river regime. Winter

1 SIP, pg. 17

and spring flows in the Sacramento River often exceed 50,000 cfs. While summer flows average 10,000 cfs, they can fall below 4,000 cfs. Daily flow probabilities for the Sacramento River at Freeport, based on U.S. Geologic Survey gauged flow data from 1942-1989, indicate that there is only a 10% probability of flows less than or equal to 10,000 cfs, and a 10% probability of flows greater than 70,000 cfs. Therefore, typical flows in the Sacramento range from 10,000 to 70,000 cfs. The critical low flows for the Sacramento River based on flow data at Freeport from 1970 to 2009 are shown in Table F-10, below.

Table F-10. Critical Receiving Water Flows

Critical Low Flows	Receiving Water Flow (cfs)
1Q10[1]	5060
7Q10[2]	5846
30Q5[3]	8234
Harmonic Mean[4]	15733

[1] Lowest daily average flow with a return frequency of 10 years.
[2] Lowest 7-day average flow with a return frequency of 10 years.
[3] Lowest 30-day average flow with a return frequency of 5 years.
[4] At Freeport from 1 January 1970 through 31 December 2009.

ii. **Water Quality Models.** For completely-mixed discharges, the Central Valley Water Board may grant a mixing zone and apply a dilution credit in accordance with Section 1.4.2.1 of the SIP, based on the dilution ratio. For incompletely-mixed discharges, the Discharger must perform a mixing zone study to demonstrate to the Central Valley Water Board that a dilution credit is appropriate. The SRWTP discharge is considered an incompletely-mixed discharge, so the Discharger conducted a mixing zone study. A mathematical dynamic model was developed by Flow Sciences Incorporated and consists of five models linked in series, with the output from previous models used as part of the inputs to subsequent models. The models are linked as shown in Figure F-1 and are described below.

PROSIM – *U.S. Bureau of Reclamation's Project Simulation Model.* PROSIM simulates the existing hydrologic conditions in the Delta study area and was used to calculate the 70-year period of record (1922-1991) that served as the basis for the SRCSD study. Flow and storage calculated by PROSIM was used as input to the Temperature Models. Also, output from PROSIM were used as input to the Fischer Delta Model (FDM) and includes: export pumping rates from Tracy and Banks; Contra Costa Water District pumping at Rock Slough and Old River; North Bay Aqueduct pumping; City of Vallejo pumping; net Delta consumptive use; Delta Cross Channel position; and Delta inflows from Yolo Bypass, San Joaquin River, Calaveras River, Cosumnes River, Mokelumne River, and Sacramento River.

Temperature Models – *U.S. Bureau of Reclamation models.* The Bureau of Reclamation has developed temperature models for five reservoirs (Trinity, Whiskytown, Shasta, Oroville, and Folsom) and three river systems (Sacramento, Feather, and American). These models estimate mean monthly water temperatures based on flow and storage quantities calculated by PROSIM.

FDM – Fischer Delta Model. The Fischer Delta Model was used to support both the near-field and far-field modeling. For the near-field region, FDM was used to disaggregate hourly flow rates for the Sacramento River at Freeport from the 70-year record of monthly flows calculated by PROSIM. The hourly flow data were then used as input to the 3-D near-field model (FLOWMOD) as well as the Longitudinal Dispersion model. For the far-field region, FDM was used to simulate the contribution of SRWTP discharges to water quality concentrations at various critical locations in the Delta

FLOWMOD – Flow Science's computational fluid dynamics model. The near-field modeling was accomplished with the 3-dimensional FLOWMOD computational fluid dynamics model developed by Flow Science. FLOWMOD was used to calculate the steady-state concentration of effluent in each grid cell of the model domain for specific combinations of river and effluent flow rates. A horizontal grid resolution of 6 feet was defined from the diffuser to a point 300 feet downstream of the diffuser. The grid resolution increased geometrically from 300 feet to 700 feet downstream of the diffuser. Results from the model defined the average effluent concentration in the area of impact (i.e., within the 200:1 dilution contour) downstream of the diffuser. SRCSD is using this model to separately evaluate the thermal characteristics of the discharge plume.

LD – Flow Science's Longitudinal Dispersion Model. The LD model was developed by Flow Science and the computer code is written in the Matlab programming language for implementation on an IBM-PC compatible microcomputer. This 1-dimensional model simulates the advection and dispersion of effluent discharged to the Sacramento River including reverse tidal flow conditions. The LD model is used to estimate the concentration in the near-field vicinity of the diffuser following the start of a diversion event in which the effluent discharge is diverted to storage when the Sacramento River flow rate falls below the minimum required 14:1 dilution ratio[1].

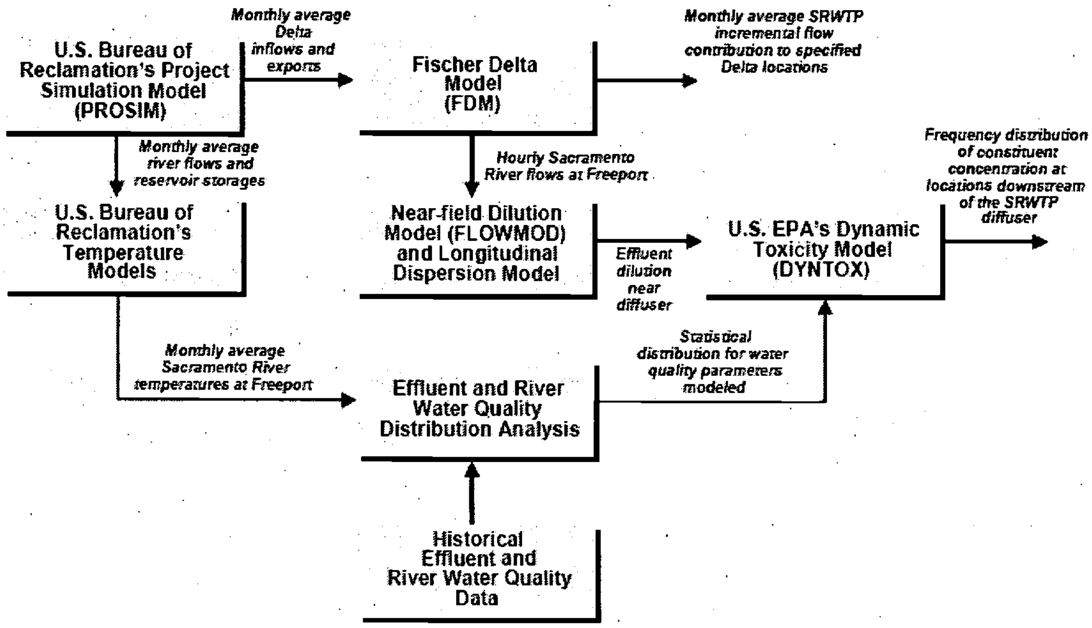
The results from the LD model are combined with the results from the FLOWMOD model (by method of superposition) to estimate the concentrations of the effluent in the near-field zone that result from "double dosing" during the flow reversal events. The length of the LD model domain

[1] The Discharger is prohibited from discharging when the dilution ratio (river:effluent) is less than 14:1 or if river flows are less than 1300 cfs and diverts all effluent discharge to emergency storage basins. These requirements ensure the diffuser is operating as designed and limits double-dosing of the discharge during flow reversals.

is 53,000 feet (about 10 miles) and includes the diffuser. The model domain is represented by 530 discrete spatial intervals, each 100 feet long. Calculations are made at a 400-second time step.

DYNTOX – U.S. EPA's Dynamic Toxicity Model. DYNTOX was developed in 1985 with funding support provided by EPA. The model is designed for waste load allocations of toxic substances. DYNTOX contains three procedures to define the frequency and duration of exposure above a specific water quality criterion: (1) continuous simulation, (2) Monte Carlo simulation, and (3) log normal analysis. The continuous simulation procedure with randomly generated water quality distributions was used for the SRWTP study. Hourly values for the 70-year simulation period resulted in over 600,000 data points that were representative of the statistical concentration distribution at 6 key locations downstream of the diffuser.

Figure F-1: Dynamic Model Flow Diagram



In the period from 2005 through 2007, the Discharger performed several field validation studies to corroborate the effectiveness of the modeling tools in representing water quality conditions in the Sacramento River. Due to the complexity of the mathematical models, in 2006 the Central Valley Water Board used the services of Tetra Tech, a USEPA contractor, to assist with the review of the dynamic model. Tetra Tech's modeling experts concluded that the model study was conducted in a sound and scientifically defensible manner. The modeling experts determined that the linked dynamic modeling system is capable of providing an accurate probabilistic representation of receiving water quality conditions. The only perceived short coming noted by the model experts from a regulatory perspective was the complexity of the system of linked models and the proprietary status of some of the model components preventing its transmittal and direct use by Central Valley Water Board staff. The results of Tetra Tech's review are summarized in a Tetra Tech memorandum dated 30 June 2008.

iii. **Evaluation of Available Dilution for Acute Aquatic Life Criteria.** USEPA Region VIII, in its "EPA Region VIII Mixing Zones and Dilution Policy", recommends no dilution for acute aquatic life criteria, stating the following, "*In incomplete mix situations, discharge limitations to implement acute chemical-specific aquatic life criteria and narrative (no acute toxicity) criteria shall be based on achieving such acute criteria at the end-of-pipe (i.e., without an allowance for dilution). This approach is intended to implement the narrative requirement prohibiting acutely toxic conditions in the mixing zone.*"[1] The SRCSD has requested an acute mixing zone for compliance with acute water quality criteria for ammonia, copper, cyanide, and chlorpyrifos.

The requested acute aquatic life mixing zone is 400 feet wide and extends 60 feet downstream of the diffuser. The proposed acute mixing zone meets the requirements of the SIP as follows:

(1) *Shall not compromise the integrity of the entire waterbody* - The TSD states that, "*If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that the mixing zone does not impinge on unique or critical habitats.*"[2] The Sacramento River is approximately 600 feet wide at the surface. The acute mixing zone is approximately 60 ft x 350 ft. The Sacramento River is a very large waterbody. Except as noted for ammonia in subsection vi., below, the acute mixing zone would not compromise the integrity of the entire waterbody.

(2) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* – The SIP requires that the acute mixing zone be appropriately sized to prevent lethality to organisms passing through the mixing zone. USEPA recommends that float times through a mixing zone less than 15 minutes ensures that there will not be lethality to passing organisms. The acute mixing zone proposed by the Discharger extends 60 feet downstream from the outfall. Based on a minimum river velocity of 0.35 feet/sec, the minimum float time is 2.8 minutes[3]. Furthermore, this Order includes an acute toxicity effluent limitation that requires compliance to be determined based on acute bioassays using 100% effluent. Compliance with these

[1] USEPA Region VIII Mixing Zones and Dilution Policy, December 1994 (Updated September 1995), (page 18)
[2] TSD, pg. 33
[3] Memorandum from Larry Walker Associates to SRCSD, Mixing Zones and Prevention of Acutely Toxic Conditions, dated 13 July 2009.

requirements ensures that acutely toxic conditions to aquatic life passing through the chronic mixing zone do not occur.

(3) <u>*Shall not*</u> *restrict the passage of aquatic life* – The SRCSD developed a dynamic model to evaluate the near-field effects of the discharge. The dynamic model was used to evaluate the zone of passage around the mixing zone where water quality objectives are met. The dynamic model indicates there is a zone of passage for aquatic life, which was verified through dye testing. The size of the zone of passage varies on either side of the river depending on the river geometry[1]. The surface of the river is approximately 600 feet across and the bottom of the river is approximately 400 feet across. Based on the model the zone of passage at the surface of the river is generally at least 100 feet on both sides of the river, while the zone of passage at the bottom of the river is greater than 40 feet from both sides of the river.

(4) <u>*Shall not*</u> *adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws* – The acute mixing zone will not cause acutely toxic conditions, allows adequate zones of passage, and, except as noted for ammonia in subsection vi., below, is sized appropriately to ensure that there will be no adverse impacts to biologically sensitive or critical habitats.

(5) <u>*Shall not*</u> *produce undesirable or nuisance aquatic life; result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; cause nuisance* – The current discharge has not been shown to result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance. This Order requires the discharge meets Title 22 (or equivalent) tertiary filtration, which will ensure continued compliance with these mixing zone requirements. There is concern that the high ammonia concentrations in the discharge create undesirable or nuisance aquatic life (see subsection vi. for ammonia, below), therefore, an acute mixing zone for ammonia is not allowed. With these requirements the acute mixing zone will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance.

(6) <u>*Shall not*</u> *dominate the receiving water body or overlap a mixing zone from different outfalls* – The acute mixing zone is small relative to the water body, so it will not dominate the water body. Furthermore, the mixing zone does not overlap mixing zones from other outfalls. There are no outfalls or mixing zones in the vicinity of the discharge.

1 Model Verification Results for FLOWMOD Simulations of SRCSD Effluent Discharge to the Sacramento River at Freeport, November 2007 Field Study, Flow Science

(7) *Shall not be allowed at or near any drinking water intake* – The acute mixing zone is not near a drinking water intake. The nearest downstream drinking water intake is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.

Although the acute aquatic life mixing zone complies with the SIP and the Basin Plan, due to concerns with aquatic toxicity in the Delta, the Central Valley Water Board has denied the allowance of an acute aquatic life mixing zone in this Order. Section 1.4.2 of the SIP states, in part, "...The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis." In this case, the Delta is impaired for unknown toxicity and has experienced a significant pelagic organism decline. Therefore, the Central Valley Water Board finds that the allowance of an acute aquatic life mixing zone is not acceptable for this discharge. Furthermore, as discussed in subsection vi, below, based on Facility performance, an acute mixing zone is either not needed for the constituents requested by the Discharger or not allowed by the Basin Plan. See subsection vi, below, for a pollutant-by-pollutant evaluation for these constituents.

iv. **Evaluation of Available Dilution for Chronic Aquatic Life Criteria.** The chronic aquatic life mixing zone is sized to protect the water body as a whole and is generally larger than the acute mixing zone. A mixing zone for chronic aquatic life criteria has been allowed in this Order for development of the WQBELs for cyanide.

The chronic aquatic life mixing zone is 400 feet wide and extends 350 feet downstream of the diffuser. The chronic mixing zone meets the requirements of the SIP as follows:

(1) *Shall not compromise the integrity of the entire waterbody* - The TSD states that, "*If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that the mixing zone does not impinge on unique or critical habitats.*"[1] The Sacramento River is approximately 600 feet wide at the surface. The chronic mixing zone is approximately 400 ft x 350 ft. The Sacramento River is a very large waterbody. Except as noted for ammonia in subsection vi., below, the chronic mixing zone would not compromise the integrity of the entire waterbody.

(2) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* – The chronic mixing zone does not allow acute aquatic life criteria to be exceeded and this Order requires acute bioassays to be conducted using 100% effluent. Compliance with these requirements

[1] TSD, pg. 33

ensures that acutely toxic conditions to aquatic life passing through the chronic mixing zone do not occur.

(3) *Shall not restrict the passage of aquatic life* – The SRCSD developed a dynamic model to evaluate the near-field effects of the discharge. The dynamic model was used to evaluate the zone of passage around the mixing zone where water quality objectives are met. The dynamic model indicates there is a zone of passage for aquatic life, which was verified through dye testing. The size of the zone of passage varies on either side of the river depending on the river geometry[1]. The surface of the river is approximately 600 feet across and the bottom of the river is approximately 400 feet across. Based on the model the zone of passage at the surface of the river is generally at least 100 feet on both sides of the river, while the zone of passage at the bottom of the river is greater than 40 feet from both sides of the river.

(4) *Shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws* – The chronic mixing zone will not cause acutely toxic conditions, allows adequate zones of passage, and, except as noted for ammonia in subsection vi., below, is sized appropriately to ensure that there will be no adverse impacts to biologically sensitive or critical habitats.

(5) *Shall not produce undesirable or nuisance aquatic life; result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; cause nuisance* – The current discharge has not been shown to result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance. This Order requires the discharge meets Title 22 (or equivalent) tertiary filtration, which will ensure continued compliance with these mixing zone requirements. There is concern that the high ammonia concentrations in the discharge create undesirable or nuisance aquatic life (see subsection vi. for ammonia, below), therefore, a chronic mixing zone for ammonia is not allowed. With these requirements the chronic mixing zone will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance.

(6) *Shall not dominate the receiving water body or overlap a mixing zone from different outfalls* – The chronic mixing zone is small relative to the water body, so it will not dominate the water body. Furthermore, the mixing zone does not overlap mixing zones from other outfalls. There are no outfalls or mixing zones in the vicinity of the discharge.

1 Model Verification Results for FLOWMOD Simulations of SRCSD Effluent Discharge to the Sacramento River at Freeport, November 2007 Field Study, Flow Science

(7) *Shall not be allowed at or near any drinking water intake* – The chronic mixing zone is not near a drinking water intake. The nearest downstream drinking water intake is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.

The chronic aquatic life mixing zone therefore complies with the SIP. The mixing zone also complies with the Basin Plan, which requires that the mixing zone not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zone, the Central Valley Water Board considered the procedures and guidelines in the EPA's Water Quality Standards Handbook, 2d Edition (updated July 2007), Section 5.1, and Section 2.2.2 of the Technical Support Document for Water Quality-based Toxics Control (TSD). The SIP incorporates the same guidelines.

v. **Evaluation of Available Dilution for Human Health Criteria.** The Discharger's dynamic model is useful in determining the mixing and dilution near the discharge (i.e., near-field) and the model domain extends 700 feet downstream. Human health-based criteria are generally based long-term exposures, such as safe levels for lifetime exposure (e.g., for carcinogens, consumption of 1 liter/day for 70 years) and the mixing zones typically extend beyond the near-field mixing estimated by the Discharger's dynamic model. Since the human health mixing zone extends beyond the model domain of the dynamic model, the Discharger conducted a study titled "Sacramento River Harmonic Mean Mixing Zone Report" (June 2010) to establish the human health mixing zone and dilution. The June 2010 study identified the point downstream of the discharge where complete mixing occurs. Based on the results of the June 2010 study, the discharge is completely mixed approximately 3 miles downstream. The Discharger has requested the human health mixing zone extend to this point.

In determining the available receiving water dilution for compliance with human carcinogen criteria, the SIP, section 1.4.2.1 requires that the harmonic mean of the receiving water flow be compared against the arithmetic mean of the effluent flow of the observed discharge period. Based on Sacramento River flow data at Freeport from 1 January 1970 to 31 December 2009 the harmonic mean river flow is 15,733 cfs. The permitted average dry weather flow for the Facility is 181 mgd (280 cfs). Therefore, a dilution ratio of 56:1 is available for compliance with human carcinogen criteria. This Order allows a dilution credit for human carcinogen criteria of 56:1 and the mixing zone extends 3 miles downstream of the discharge. For non-human carcinogen human health criteria, the TSD recommends dilution based on a 30Q5 receiving water flow[1], which is the lowest 30 day average flow with a recurrence frequency of once in five years. Based on Sacramento River flow

1 USEPA Water Quality Handbook, Section 5.2

data at Freeport from 1 January 1970 to 31 December 2009 the 30Q5 flow is 8234 cfs, resulting in a dilution credit of 29:1.

The human health mixing zone meets the requirements of the SIP as follows:

(1) Shall not *compromise the integrity of the entire waterbody* - The TSD states that, "*If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that the mixing zone does not impinge on unique or critical habitats.*"[1] The Sacramento River is a very large waterbody and the human health mixing zone is not applicable to aquatic life criteria. Except as noted for nitrate in subsection vi., below, the human health mixing zone does not compromise the integrity of the entire waterbody.

(2) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* –The human health mixing zone is not applicable to aquatic life criteria. Therefore, acutely toxic conditions will not occur in the mixing zone.

(3) *Shall not restrict the passage of aquatic life* – The human health mixing zone is not applicable to aquatic life criteria. Therefore, the mixing zone will not restrict the passage of aquatic life.

(4) *Shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws* – The human health mixing zone is not applicable to aquatic life criteria. Except as noted for nitrate in subsection vi., below, the mixing zone will not impact biologically sensitive or critical habitats.

(5) *Shall not produce undesirable or nuisance aquatic life; result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; cause nuisance* – Except as noted for nitrate (see subsection vi, below), the allowance of a human health mixing zone will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance.

(6) *Shall not dominate the receiving water body or overlap a mixing zone from different outfalls* – The human health mixing zone is small relative to the water body, so it will not dominate the water body. Furthermore, the mixing zone does not overlap mixing zones from other outfalls. There are no outfalls or mixing zones in the vicinity of the discharge.

1 TSD, pg. 33

(7) *Shall not be allowed at or near any drinking water intake* – There are no drinking water intakes within the human health mixing zone. The nearest drinking water intake is the Freeport Regional Water Authority intake one mile upstream of the discharge at Freeport, which is owned and operated by East Bay Municipal Utility District (EBMUD). An operating agreement between the EBMUD and the Discharger dated 2006 will prevent diversion of river water containing diluted treated wastewater at the Freeport water intake. The nearest downstream drinking water intake is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.

The human health mixing zone therefore complies with the SIP. The mixing zone also complies with the Basin Plan, which requires that the mixing zone not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zone, the Central Valley Water Board considered the procedures and guidelines in the EPA's Water Quality Standards Handbook, 2d Edition (updated July 2007), Section 5.1, and Section 2.2.2 of the Technical Support Document for Water Quality-based Toxics Control (TSD). The SIP incorporates the same guidelines.

vi. **Evaluation of Available Dilution for Specific Constituents (Pollutant-by-Pollutant Evaluation).** When determining to allow dilution credits for a specific pollutant several factors must be considered, such as, available assimilative capacity, facility performance, and best practicable treatment or control. In this subsection a pollutant-by-pollutant evaluation of dilution is discussed. The SRCSD requested acute and chronic aquatic life dilution credits for ammonia, copper, cyanide, and chlorpyrifos. Human carcinogen dilution credits were requested for carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methlyene chloride, tetrachloroethylene, pentachlorophenol, bis(2-ethylhexyl)phthalate, dibenzo(ah)anthracene, and N-nitrosodimethylamine. Additionally, human health dilution credits were requested for manganese, nitrate, and MTBE. A pollutant-by-pollutant evaluation is discussed below.

Ammonia – An acute or chronic mixing zone for ammonia does not meet the mixing zone requirements of the SIP. The SIP requires, in part, that mixing zones do not;

(1) compromise the integrity of the entire water body;

(2) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws; and

(3) produce undesirable or nuisance aquatic life;

The allowance of acute or chronic mixing zones for ammonia do not meet these requirements, because ammonia discharges from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta, not just the areas defined by the requested mixing zones. The allowance of the requested mixing zones for ammonia would comprise the integrity of the entire water body, adversely impact biologically sensitive or critical habitats, and produce undesirable or nuisance aquatic life.

Acute and chronic aquatic life dilution credits for ammonia have not been granted. This Order requires full nitrification for removal of ammonia. See Section IV.C.3 of the Fact Sheet for a detailed discussion.

Copper – Assimilative capacity is available for copper in the receiving water. However, based on facility performance, dilution credits for copper are not needed, therefore, dilution credits have not been allowed for copper. Table F-11, below, shows the WQBELs calculated using SRCSD's dynamic model with the allowance of acute and chronic aquatic life dilution, end-of-pipe effluent limitations using a reasonable worst-case steady-state approach, and the Facility's performance. This information demonstrates the Facility can meet end-of-pipe effluent limitations, therefore, no dilution credits have been allowed for copper.

Table F-11. WQBELs for Copper

	Average Monthly Effluent Limitation	Maximum Daily Effluent Limitation
Dynamic Modeling	7.7 µg/L	9.8 µg/L
Steady-State Approach	7.3 µg/L	9.3 µg/L
Facility Performance[1]	6.8 µg/L	

1 Projected 99.9th percentile of effluent copper data from June 2005-October 2009

Cyanide – Table F-12, below, shows the WQBELs for cyanide calculated using SRCSD's dynamic model with the allowance of acute and chronic aquatic life dilution, WQBELs calculated using SRCSD's dynamic model with the allowance of only chronic aquatic life dilution, end-of-pipe effluent limitations using a reasonable worst-case steady-state approach, and the Facility's performance. This information demonstrates the Facility cannot meet end-of-pipe effluent limits, but can meet WQBELs calculated with the allowance of chronic aquatic life dilution. Acute aquatic life dilution is not needed for cyanide. Assimilative capacity is available for cyanide in the receiving water, and, as discussed above, the chronic aquatic life mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for cyanide have been developed considering the allowance of chronic aquatic life dilution.

Table F-12. WQBELs for Cyanide

	Average Monthly Effluent Limitation	Maximum Daily Effluent Limitation
Dynamic Modeling (acute and chronic dilution)	21 µg/L	40 µg/L
Dynamic Modeling (chronic dilution only)	11 µg/L	22 µg/L
Steady-State Approach	4.3 µg/L	8.3 µg/L
Facility Performance[1]	11 µg/L	

1 Projected 99.9th percentile of effluent cyanide data from June 2005-October 2009

Chlorpyrifos – A TMDL has been adopted for chlorpyrifos and diazinon and includes waste load allocations (WLA) for NPDES dischargers. The WLA have been adopted in the Basin Plan as water quality objectives and dilution are not allowed. Therefore, end-of-pipe effluent limitations based on the Basin Plan water quality objectives are required by the Basin Plan.

Aluminum– Based on existing effluent data from June 2005 – October 2009, the Facility can meet end-of-pipe effluent limitations for aluminum of 200 µg/L annual average. Therefore, a dilution credit has not been allowed. Additionally, there is no assimilative capacity in the receiving water. The Sacramento River maximum aluminum concentrations are over 8000 µg/L. The Discharger collected 61 samples during this time period resulting in samples ranging from 12 to 35.2 µg/L. The effluent sampling was part of the three times per year sampling required in the previous permit, which required daily sampling for one week three times per year. The discharge never exceeded the new AMEL or MDEL.

Carbon tetrachloride - Based on existing effluent data from June 2005-October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for carbon tetrachloride of 0.25 µg/L and 0.50 µg/L, as an average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL), respectively. The Discharger collected 101 samples during this time period resulting in 95 non-detect samples (i.e., ranging from <0.06 µg/L to <0.5 µg/L), three J-flagged estimates of 0.1 µg/L, 0.1 µg/L, and 0.2 µg/L, and three samples above the reporting level at 0.5 µg/L, 1.4 µg/L, and 1.7 µg/L. The effluent sampling was part of the three times per year sampling required in the previous permit, which required daily sampling for one week three times per year. Assimilative capacity is available for carbon tetrachloride in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for carbon tetrachloride have been developed considering the allowance of human carcinogen dilution credits.

Chlorodibromomethane – Based on existing effluent data from June 2005 – October 2009, the Facility cannot meet end-of-pipe effluent limitations for chlorodibromomethane of 0.41 µg/L and 0.82 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for chlorodibromomethane in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for chlorodibromomethane have been developed considering the allowance of human carcinogen dilution credits.

Dichlorobromomethane – Based on existing effluent data from June 2005–October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for dichlorobromomethane of 0.56 µg/L and 1.1 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for dichlorobromomethane in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for dichlorobromomethane have been developed considering the allowance of human carcinogen dilution credits.

Methylene chloride – Based on existing effluent data from June 2005-October 2009, the Facility cannot meet end-of-pipe effluent limitations for methylene chloride of 4.7 µg/L and 11 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for methylene chloride in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for methylene chloride have been developed considering the allowance of human carcinogen dilution credits.

Tetrachloroethylene – Based on existing effluent data from June 2005-October 2009, the Facility cannot meet end-of-pipe effluent limitations for tetrachloroethylene of 0.8 µg/L and 1.6 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for tetrachloroethylene in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for tetrachloroethylene have been developed considering the allowance of human carcinogen dilution credits.

Pentachlorophenol – Based on existing effluent data from June 2005-October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for pentachlorophenol of 0.28 µg/L and 0.56 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for pentachlorophenol in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for pentachlorophenol have been developed considering the allowance of human carcinogen dilution credits.

Bis(2-ethylhexyl)phthalate – Based on existing effluent data from June 2005- October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for bis(2-ethylhexyl)phthalate of 1.8 µg/L and 3.4 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for bis(2-ethylhexyl)phthalate in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for bis(2-ethylhexyl)phthalate have been developed considering the allowance of human carcinogen dilution credits.

Dibenzo(ah)anthracene – Based on existing effluent data from June 2005-October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for dibenzo(ah)anthracene of 4 ng/L and 9 ng/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for dibenzo(ah)anthracene in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for dibenzo(ah)anthracene have been developed considering the allowance of human carcinogen dilution credits.

N-nitrosodimethylamine – Based on existing effluent data from June 2005-October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for N-nitrosodimethylamine of 0.69 ng/L and 1.38 ng/L, as an AMEL and MDEL, respectively. The receiving water showed no detectable concentrations for NDMA out of 47 samples, but the detection levels are too high to detect low concentrations. Thus, no assimilative capacity is available for N-nitrosodimethylamine in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, no dilution credits have been allowed to develop the WQBELs for N-nitrosodimethylamine.

Manganese – Based on existing effluent data from April 2009-June 2009, it appears that the Facility cannot meet an end-of-pipe AMEL for manganese of 50 µg/L. The Discharger collected 34 samples during this time period and the maximum effluent concentration was 82 µg/L and averaged 64 µg/L. Assimilative capacity is available for manganese in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for manganese have been developed considering the allowance of non-human carcinogen dilution credits.

Nitrate – Currently, the Discharger's effluent contains very low concentrations of nitrate, ranging from 0.016 to 1.4 mg/L with an average of 0.13 mg/L. However, this Order requires the Discharger nitrify its effluent, therefore, the ammonia will convert to nitrate and the nitrate concentrations will increase. Consequently, the Facility will not be able to meet end-of-pipe effluent limits for Nitrate, based on the primary MCL of 10 mg/L (as N). Although assimilative capacity and dilution is available in the receiving water for compliance with the primary MCL, a human health mixing zone for nitrate does not meet the mixing zone requirements of the SIP. The SIP requires, in part, that mixing zones do not;

(1) compromise the integrity of the entire water body;

(2) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws; and

(3) produce undesirable or nuisance aquatic life;

The allowance of a human health mixing zone for nitrate does not meet these requirements, because elevated nitrogen discharges from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta, not just the areas defined by the requested mixing zone. The allowance of the requested mixing zone for nitrate would compromise the integrity of the entire water body, adversely impact biologically sensitive or critical habitats, and produce undesirable or nuisance aquatic life.

Human health dilution credits for nitrate have not been granted. This Order requires denitrification for removal of nitrate to meet the primary MCL at the end-of-pipe. See Section IV.C.3 of the Fact Sheet for a detailed discussion.

MTBE – Based on existing effluent data from June 2005- October 2009, it appears that the Facility cannot meet an end-of-pipe annual average effluent limitation for MTBE of 5 µg/L. Assimilative capacity is available for MTBE in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for MTBE have been developed considering the allowance of non-human carcinogen dilution credits.

3. Determining the Need for WQBELs

a. Unless otherwise stated, the Central Valley Water Board conducted the RPA in accordance with section 1.3 of the SIP. Although the SIP applies directly to the control of CTR priority pollutants, the State Water Board has held that the Central Valley Water Board may use the SIP as guidance for water quality-based toxics control.[1] The SIP states in the introduction "*The goal of this Policy is to establish a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency.*" Therefore, unless otherwise stated, in this Order the RPA procedures from the SIP were used to evaluate reasonable potential for both CTR and non-CTR constituents based on information submitted as part of the application, in studies, and as directed by monitoring and reporting programs.

[1] See Order WQO 2001-16 (Napa) and Order WQO 2004-0013 (Yuba City).

b. Constituents with Limited Data. Reasonable potential cannot be determined for the following constituents because effluent data are limited or ambient background concentrations are not available. The Discharger is required to continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available, further analysis will be conducted to determine whether to add numeric effluent limitations or to continue monitoring.

i. 2,3,7,8-TCDD and TCDD-Equivalents. The CTR includes a criterion for 2,3,7,8-TCDD of 0.013 pg/l for the protection of human health based on consumption of water and organisms and 0.014 pg/L for ingestion of organisms only. The CTR does not include criteria for other dioxin congeners and there are no formally promulgated numeric water quality criteria for the other dioxin congeners. Therefore, determination of reasonable potential and effluent limitations, when appropriate, would be based on an interpretation of the Basin Plan narrative toxicity standard. The SIP does not explicitly direct the Regional Water Boards to establish effluent limits when dioxin congeners are detected in the effluent. Rather it directs the discharger to report the data and in its report to multiply each measured or estimated congener concentration by its respective toxic equivalency factors (TEF) value and report the sum of these values to the Regional Boards.

2,3,7,8-TCDD was not detected in any of the samples collected in the Facility effluent or in the receiving water. The MEC for TCDD-equivalents was 26.0 µg/L. In the effluent two of the congeners, OCDD and 1,2,3,6,7,8-HpCDD were reported as detected. The maximum observed upstream receiving water TCDD-equivalents concentration was 28.0. The CTR includes a criterion for 2,3,7,8-TCDD of 0.013 pg/L for the protection of human health based on consumption of water and organisms and 0.014 pg/L for ingestion of organisms only. The CTR does not include criteria for other dioxin congeners and there are no formally promulgated numeric water quality criteria for the other dioxin congeners. Therefore, determination of reasonable potential and effluent limitations, when appropriate, would be based on an interpretation of the Basin Plan narrative toxicity standard. In the receiving water, two of the congeners OCDD and 1,2,3,6,7,8-HpCDD were reported as detected.

Based on the limited data provided, the Central Valley Water Board is unable to determine if the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for TCDD-equivalents. WQBELs for TCDD-equivalents are not included in this Order due to the fact that 1) only TCDD-equivalents were detected in the effluent and receiving water and not TCDD and, 2) the Sacramento-San Joaquin Delta is not listed as impaired for dioxins and furans.

Due to the concerns of the potential impacts of dioxins and furans on the receiving water, this Order will require consecutive three times annually monitoring of all 2,3,7,8 TCDD congeners. If monitoring data indicates the potential for exceedance of applicable criteria, then the Central Valley Water Board will reopen the Order and establish applicable WQBELs for TCDD-equivalents. This Order also requires the Discharger to implement measures to evaluate and reduce detected dioxins OCDD and 1,2,3,6,7,8-HpCDD in its discharge to the receiving water. The Special Provision in section VI.C.3.c of this Order requires the Discharger to prepare a 2,3,7,8-TCDD congeners source evaluation and minimization plan. Implementation measures to reduce detectable amounts of cogeners may include source control and other effective means. Compliance with these requirements should result in the reduction of detectable amounts of TCDD-equivalents in the effluent discharged to the receiving water.

ii. **Perchlorate.** The primary MCL for perchlorate is 6 µg/L. As part of the pretreatment monitoring program the Discharger began monitoring for perchlorate in February 2000. The MEC for perchlorate is 600 µg/L and was detected 14 out of 81 samples. All R-1 samples showed no detection for perchlorate. The analytical test method used was EPA 300.0 followed by EPA 314 starting in October 2008. Neither EPA 300.0 or 314 are recommended for wastewater analyses, instead these tests are used for surface and ground water. Both these tests can be influenced by salts and give false positive readings. Starting in February 2009, any detection of perchlorate by EPA 314 is further confirmed with EPA 331. Since initiating the confirmation testing with EPA 331, no perchlorate has been detected in the effluent. This Order requires the Discharger conduct a study for perchlorate to evaluate if perchlorate is actually present in the discharge. If monitoring indicates exceedance of applicable criteria, then the Central Valley Water Board will reopen the Order and will establish applicable WQBELs for perchlorate.

c. **Constituents with No Reasonable Potential.** WQBELs are not included in this Order for constituents that do not demonstrate reasonable potential; however, monitoring for those pollutants is established in this Order as required by the SIP. If the results of effluent monitoring demonstrate reasonable potential, this Order may be reopened and modified by adding an appropriate effluent limitation.

i. **Oil and Grease.** The Basin Plan contains a narrative oil and grease objective which states, "Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses."

Effluent oil and grease concentrations from June 2005 to July 2008 are always less than 6 mg/L. Therefore, oil and grease in the discharge has no reasonable potential to cause or contribute to an in-stream excursion above the narrative toxicity objective or Basin Plan numeric objectives and waste load allocation.

ii. **Persistent Chlorinated Hydrocarbon Pesticides.** The Basin Plan requires that no individual pesticides shall be present in concentrations that adversely affect beneficial uses; discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses; persistent chlorinated hydrocarbon pesticides shall not be present in the water column at detectable concentrations; and pesticide concentrations shall not exceed those allowable by applicable antidegradation policies. Persistent chlorinated hydrocarbon pesticides include aldrin; alpha-BHC; beta-BHC; gamma-BHC (lindane); delta-BHC; chlordane; 4,4-DDT; 4,4-DDE; 4,4-DDD; dieldrin; alpha-endosulfan; beta-endosulfan; endosulfan sulfate; endrin; endrin aldehyde; heptachlor; heptachlor epoxide; and toxaphene.

Aldrin; alpha-BHC; beta-BHC; gamma-BHC; delta-BHC; chlordane; 4,4-DDT; 4,4-DDE; 4,4-DDD; dieldrin; alpha-endosulfan; beta-endosulfan; endosulfan sulfate; endrin; endrin aldehyde; heptachlor; heptachlor epoxide; and toxaphene were not detected in the effluent in concentrations with detection levels ranging from as high as 0.04 µg/L to 0.002. There is no reasonable potential for these constituents to exceed the Basin Plan objectives for persistent chlorinated hydrocarbon pesticides.

iii. **Salinity.** There are no USEPA water quality criteria for the protection of aquatic organisms for electrical conductivity, total dissolved solids, sulfate, and chloride. The Basin Plan contains a chemical constituent objective that incorporates state MCLs, contains a narrative objective, and contains numeric water quality objectives for electrical conductivity, total dissolved solids, sulfate, and chloride.

Table F-13. Salinity Water Quality Criteria/Objectives

Parameter	Agricultural WQ Goal[1]	Secondary MCL[3]	Average Ambient Background	Effluent	
				Average	Maximum
EC (µmhos/cm)	Varies[2]	900, 1600, 2200	163	764	960
TDS (mg/L)	Varies	500, 1000, 1500	98	410	540
Sulfate (mg/L)	Varies	250, 500, 600	--	90	110
Chloride (mg/L)	Varies	250, 500, 600	5.1	90	100

1 Agricultural water quality goals based on *Water Quality for Agriculture*, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985)

2 The EC level in irrigation water that harms crop production depends on the crop type, soil type, irrigation methods, rainfall, and other factors. An EC level of 700 umhos/cm is generally considered to present no risk of salinity impacts to crops. However, many crops are grown successfully with higher salinities.

3 The secondary MCLs are stated as a recommended level, upper level, and a short-term maximum level.

Table F-14. Basin Plan Water Quality Objectives for EC Sacramento River at Emmaton, Based on Water Year Type (maximum 14-day running average of mean daily EC in µmhos/cm)

Date	Water Year Type				
	Wet	Above Normal	Below Normal	Dry	Critical
1 April – 14 June	450	450	450	450	2780
15 June – 19 June	450	450	450	1670	2780
20 June – 30 June	450	450	1140	1670	2780
1 July - 15 August	450	630	1140	1670	2780

For priority pollutants, the SIP dictates the procedures for conducting the RPA. EC, TDS, chloride, and sulfate are not priority pollutants. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used best professional judgment in determining the appropriate method for conducting the RPA for these non-priority pollutant salinity constituents. For conducting the RPA, the USEPA recommends using a mass-balance approach to determine the expected critical downstream receiving water concentration using a steady-state approach[1]. This downstream receiving water concentration is then compared to the applicable water quality objectives to determine if the discharge has reasonable potential to cause or contribute to an in-stream excursion. This approach allows assimilative capacity and dilution to be factored into the RPA. This USEPA recommended approach has been used for these salinity constituents. The critical downstream receiving water concentration is calculated using equation 2 below:

$$C_r = \frac{Q_sC_s + Q_dC_d}{Q_r} \qquad \text{(Equation 2)}$$

Where,

Q_s = Critical stream flow (30Q5) recommended by USEPA for non-carcinogen human health criteria.

Q_d = Critical effluent flow from discharge flow data (maximum permitted discharge)

Q_r = Sum of critical stream flow and critical effluent flow

C_s = Critical upstream pollutant concentration

C_d = Critical effluent pollutant concentration

C_r = Critical downstream receiving water pollutant concentration

[1] USEPA NPDES Permit Writers' Course (EPA 833-B-97-001 rev. October 2009)

The critical stream flow used in this evaluation for the salinity constituents is a 30Q5 flow of 8234 cubic feet per second (cfs) The critical stream flow was calculated based on USGS flow data for the Sacramento River at the Freeport Bridge for the period of 1970 – 2009.

The critical effluent flow, Q_d, is 181 million gallons per day (mgd) (i.e., 281 cfs), which is the maximum permitted flow allowed in this Order. The critical effluent pollutant concentration, C_d, was determined using statistics recommended in the TSD for statistically calculating the projected maximum effluent concentration (MEC) (i.e., Table 3-1 of the TSD using the 99% probability basis and 99% confidence level).

(a) Chloride. Chloride concentrations in the effluent ranged from 76 mg/L to 100 mg/L, with an average of 91 mg/L. Background concentrations in Sacramento-San Joaquin Delta ranged from 2.1 mg/L to 11 mg/L, with an average of 5.2 mg/L, for 98 samples collected by the Discharger from 15 January 1998 through 12 June 2008. The effluent and receiving water chloride levels do not exceed the agricultural water goal. Therefore, there is no reasonable potential for the discharge to cause or contribute to an instream excursion of the applicable water quality objectives for chloride.

(b) Electrical Conductivity. A review of the Discharger's monitoring reports shows an average effluent EC of 764 µmhos/cm, with a range from 369 µmhos/cm to 960 µmhos/cm. The projected maximum effluent concentration, calculated as discussed above, is 972 µmhos/cm. The maximum background receiving water concentration was 260 µmhos/cm, and averaged 160 µmhos/cm, based on 72 samples collected from November 2000 to July 2008. The maximum instream EC concentration is 283 µmhos/cm, using Equation 2, above. The maximum instream EC concentration is less than all applicable water quality objectives for EC. Therefore, there is no reasonable potential for the discharge to cause or contribute to an instream excursion of the applicable water quality objectives for EC.

(c) Sulfate. Sulfate concentrations in the effluent ranged from 50 mg/L to 110 mg/L, with an average of 90 mg/L. Background concentrations in the Sacramento-San Joaquin Delta were not monitored. However, based on the low chloride, electrical conductivity, the sulfate concentrations are probably also low. There is no reasonable potential for the discharge to cause or contribute to an instream excursion of the applicable water quality objectives for sulfate.

(d) Total Dissolved Solids. The average TDS effluent concentration was 410 mg/L with concentrations ranging from 200 mg/L to 540 mg/L. The projected maximum effluent concentration, calculated as discussed above, is 547 mg/L. The background receiving water TDS ranged from 35 mg/L to

180 mg/L, with an average of 98 mg/L. The maximum instream TDS concentration is 192 mg/L, using Equation 2, above. The maximum instream TDS concentration is less than all applicable water quality objectives for TDS. Therefore, there is no reasonable potential for the discharge to cause or contribute to an instream excursion of the applicable water quality objectives for TDS.

Based on the relatively low reported salinity, the discharge does not have reasonable potential to cause or contribute to an in-stream excursion of water quality objectives for salinity. However, since the discharge is to the Sacramento-San Joaquin Delta, an additional concern is the salt contribution to Delta waters. Allowing the Discharger to increase its current salt loading may be contrary to the Region-wide effort to address salinity in the Central Valley. Therefore, this Order includes a performance-based effluent limitation of 900 µmhos/cm for EC to be applied as an annual average to limit the discharge to current levels. This performance-based effluent limitation was calculated as the 99.9th percentile of the running annual average effluent EC based on effluent data from June 2006 through April 2010.

In order to ensure that the Discharger will continue to control the discharge of salinity, this Order includes a requirement to develop and implement a salinity evaluation and minimization plan. Also water supply monitoring is required to evaluate the relative contribution of salt from the source water to the effluent.

iv. Lead.

(a) **WQO.** The CTR includes hardness-dependant criteria for the protection of freshwater aquatic life for lead. The criteria for lead are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentration to total concentrations. The USEPA default conversion factors for lead were used for the discharge.

(b) **RPA Results.** For the effluent, the applicable lead chronic criterion (maximum 4-day average concentration) is 2.1 µg/L and the applicable acute criterion (maximum (1-hour concentration) is 54 µg/L, as total recoverable, (see Table F-9, above). The MEC for total lead was 1.19 µg/L, based on data collected between June 2005 and July 2008. For the receiving water, the applicable lead chronic criterion is 0.57 µg/L and the applicable acute criterion is 15 µg/L, as total recoverable, based on a hardness of 26 mg/L (as $CaCO_3$), using USEPA default translators. The maximum observed upstream total lead concentration was 0.12 µg/L, based on data from 1992-2008. Based on this information, lead in the discharge does not exhibit reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

v. Silver.

(a) **WQO.** The CTR includes hardness-dependant criteria for the protection of freshwater aquatic life for silver. The criteria for silver are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentration to total concentrations. The USEPA default conversion factors for silver were used for the discharge.

(b) **RPA Results.** For the effluent, the applicable silver acute criterion (maximum (1-hour concentration) is 1.8 µg/L, as total recoverable, (see Table F-9, above). The MEC for total silver was 0.15 µg/L, based on data collected between June 2005 and July 2008. For the receiving water, the applicable silver acute criterion is 0.4 µg/L, as total recoverable, based on a hardness of 26 mg/L (as $CaCO_3$), using USEPA default translators. The maximum observed upstream total silver concentration was 0.02 µg/L, based on data from 1992-2008. Based on this information, silver in the discharge does not exhibit reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

vi. Zinc.

(a) **WQO.** The CTR includes hardness-dependant criteria for the protection of freshwater aquatic life for zinc. The criteria for zinc are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentration to total concentrations. The USEPA default conversion factors for silver were used for the discharge.

(b) **RPA Results.** For the effluent, the applicable zinc chronic criterion (maximum 4-day average concentration) is 99 µg/L and the applicable acute criterion (maximum (1-hour concentration) is 99 µg/L, as total recoverable, (see Table F-9, above). The MEC for total zinc was 33.5 µg/L, based on data collected between June 2005 and July 2008. For the receiving water, the applicable zinc acute and chronic criterion is 38 µg/L, as total recoverable, based on a hardness of 26 mg/L (as $CaCO_3$), using USEPA default translators. The maximum observed upstream total zinc concentration was 2.17 µg/L, based on data from 1992-2008. Based on this information, zinc in the discharge does not exhibit reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

vi. 1,2-Diphenyl-hydrazine

(a) **WQO.** The CTR includes a criterion of 0.04 µg/L for 1,2-diphenyl-hydrazine for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** The maximum observed upstream receiving water concentration was not detected out of 17 samples at a MDL of <0.1 µg/L. The maximum effluent concentration (MEC) for 1,2-diphenyl-hydrazine was 2.8 µg/L J-flagged on 8 June 2007 with another J-flagged of 2.1 µg/L on 9 June 2007 out of 85 samples. However, the Discharger submitted a technical memorandum (TM) from Larry Walker Associates dated 26 May 2010 that provided evidence that the two detected samples are not representative of the effluent. The TM found that, "1,2-diphenyl-hydrazine rapidly oxidizes to azobenzene in water. The Agency for Toxic Substances and Disease Registry (ATSDR) toxicological profile[1] reports that analysis of 1,2-diphenylhydrazine in wastewater is "virtually meaningless" because, due to this oxidation, the concentration measured in the sample cannot be directly related to the actual concentration at the time of collection. One study referenced in the ATSDR toxicological profile reported that 1,2-diphenylhydrazine, '. . . instantaneously decomposes to azobenzene in the GC injection port,' and therefore gas chromatography (GC) is not suitable for detecting 1,2-diphenyl-hydrazine." This information puts into question the two j-flagged samples that were measured using EPA Method 625, which is a gas chromatography method.

Therefore, at this time there is insufficient information to make a determination whether 1,2-diphenyl-hydrazine in the discharge has reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health. This Order requires the Discharger conduct a study to evaluate the effluent for 1,2-diphenyl-hydrazine using appropriate analytical methods to determine if there is reasonable potential.

d. **Constituents with Reasonable Potential.** The Central Valley Water Board finds that the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for copper, mercury, cyanide, carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methylene chloride, tetrachloroethylene, pentachlorophenol, bis(2-ethylhexyl)phthalate, dibenzo(ah)anthracene, N-nitrosodimethylamine, aluminum, ammonia, nitrate, manganese, chlorpyrifos and MTBE. WQBELs for these constituents are included in this Order. A summary of the RPA is provided in Attachment G, and a detailed discussion of the RPA for each constituent is provided below.

i. **Aluminum**

(a) **WQO.** The Secondary MCL for aluminum for the protection of the MUN beneficial use is 200 µg/L. In addition, USEPA developed National Recommended Ambient Water Quality Criteria (NAWQC) for protection of freshwater aquatic life for aluminum. The recommended 4-day average

[1] ATSDR, 1990. Toxicological Profile for 1,2,-Diphenylhydrazine. Available at: http://www.atsdr.cdc.gov/toxprofiles/tp136.html.

(chronic) and 1-hour average (acute) criteria for aluminum are 87 µg/L and 750 µg/L, respectively, for waters with a pH of 6.5 to 9.0. USEPA recommends that the ambient criteria are protective of the aquatic beneficial uses of receiving waters in lieu of site-specific criteria. However, information contained in the footnotes to the NAWQC indicate that the development of the chronic criterion was based on specific receiving water conditions where there is low pH (below 6.5) and low hardness levels (below 50 mg/L as $CaCO_3$). The Sacramento River (SR) has been measured to have hardness values—typically between 26 and 100 mg/L as $CaCO_3$. The SR has been measured above the discharge to have a pH between 6.4 to 8.8. Thus, it is unlikely that application of the chronic criterion of 87 µg/L is necessary to protect aquatic life in the Sacramento River in the vicinity of the discharge. For similar reasons, the Utah Department of Environmental Quality (Department) only applies the 87 µg/L chronic criterion for aluminum where the pH is less than 7.0 and the hardness is less than 50 mg/L as $CaCO_3$ the receiving water after mixing. For conditions where the pH equals or exceeds 7.0 and the hardness is equal to or exceeds 50 mg/L as $CaCO_3$, the Department regulates aluminum based on the 750 µg/L acute criterion. In this site-specific case it is likely that application of the stringent chronic criteria (87µg/L) is overly protective.

(b) RPA Results. The maximum effluent concentration (MEC) for acid soluble aluminum was 35.2 µg/L out of 61 samples while the maximum observed upstream receiving water total concentration was 8800 µg/L out of 32 samples. Therefore, aluminum in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above both the NAWQA chronic water quality object and the secondary MCL.

(c) WQBELs. Due to no assimilative capacity, dilution credits are not allowed for development of the WQBELs for aluminum. This Order contains a final annual average effluent limitation for aluminum of 200 µg/L based on the secondary MCL. In addition, an AMEL of 503 µg/L and MDEL of 750 µg/L has been applied based on USEPA's NAWQC for aluminum for protection of aquatic life.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 35.2 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

ii. **Ammonia**

(a) WQO. The NAWQC for the protection of freshwater aquatic life for total ammonia, recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. USEPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. USEPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. Because the Sacramento-San Joaquin Delta has a beneficial use of cold freshwater habitat and the presence of salmonids and early fish life stages in the Sacramento-San Joaquin Delta is well-documented, the recommended criteria for waters where salmonids and early life stages are present were used.

The maximum permitted effluent pH is 8.0, and is based on Facility performance. The Basin Plan objective for pH in the receiving stream is the range of 6.5 to 8.5. In order to protect against the worst-case short-term exposure of an organism, a pH value of 8.0 was used to derive the acute criterion. The resulting acute criterion is 5.62 mg/L.

The maximum observed 30-day rolling average temperature and the maximum observed pH of the Sacramento River were used to calculate the 30-day CCC. The maximum observed 30-day average Sacramento River temperature was 72.5°F (22.5°C), for the rolling 30-day period ending 4 September 2001. The maximum observed Sacramento River pH value was 8.0 on 9 September 2000. Using a pH value of 8.0 and the worst-case temperature value of 72.5°F (22.5°C) on a rolling 30-day basis, the resulting 30-day CCC is 1.68 mg/L (as N). The 4-day average concentration is derived in accordance with the USEPA criterion as 2.5 times the 30-day CCC. Based on the 30-day CCC of 1.68 mg/L (as N), the 4-day average concentration that should not be exceeded is 4.2 mg/L (as N).

(b) **RPA Results**. Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. The Discharger does not currently use nitrification to remove ammonia from the waste stream. Ammonia is known to cause acute and/or chronic toxicity to aquatic organisms. Therefore, the discharge has reasonable potential to cause or contribute to an exceedance of the Basin Plan's narrative toxicity objective in the receiving water.

(c) **Dilution Considerations.** As discussed in Section IV.C.2.d of the Fact Sheet, an allowance for chronic aquatic life dilution may be granted. However, based on the considerations below and discussed in more detail in Attachment J, no dilution has been allowed for ammonia. The Central

Valley Water Board determines that the Discharger must fully nitrify and denitrify its wastewater to reduce ammonia and nitrogen for the following reasons:

(1) Recent studies suggest that ammonia at ambient concentrations in the Sacramento River, Delta and Suisun Bay may be acutely toxic to native *Pseudodiaptomus forbesi (copepod)*.

(2) A consensus of scientific experts concluded the SRWTP is a major source of ammonia to the Delta[1].

(3) Recent studies provide evidence that ammonia from the SRWTP discharge is contributing to the inhibition nitrogen uptake by diatoms in Suisun Bay.

(4) Ammonia along with the clam, *Corbula* and high turbidity are attributed to reducing diatom production and standing biomass in the Suisun Bay.

(5) Downstream of the discharge point, ammonia may be a cause in the shift of the aquatic community from diatoms to smaller phytoplankton species that are less desirable as food species.

(6) Regardless of whether ammonia is directly or indirectly contributing to the POD, ammonia is shown to affect adult *Pseudodiaptomus forbesi* reproduction at concentrations greater than or equal to 0.79 mg/L. And nauplii and juvenile *Pseudodiaptomus forbesi* are affected at ammonia concentrations greater to or equal 0.36 mg/L. These ammonia concentrations can be found downstream of the discharge. The beneficial use protection extends to all aquatic life and not limited to pelagic organisms.

(7) USEPA expects to publish the 2009 Ammonia Criteria Update which includes more stringent ammonia criteria for freshwater mussels compared with criteria for salmonids in early 2011[2]. Freshwater mussels reside in the Upper Sacramento River above and likely below the SRWTP discharge.

(8) The Discharger's effluent contains ammonia and BOD at levels that use all the assimilative capacity for oxygen demanding substances in the Sacramento-San Joaquin Delta. This results in no assimilative capacity for other cities and communities to discharge oxygen demanding constituents, which is needed for them to grow despite the fact that most of these cities and communities are already

[1] Sommer, T., Cl Armor, R. Baxter, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K Souza. 2007. The Collapse of Pelagic Fishes in the Upper San Franisco Estuary. Fisheries 32(6):270-277.

[2] Personal Communication with Lisa Huff USEPA with Kathy Harder, August 2010.

implementing Best Practical Treatment and Control (BPTC) at their own facilities and SRWTP is not.

(9) The Discharger's effluent contains nitrosoamines at levels that are greater than 100 times the primary MCL. Nitrosamines are disinfection byproducts that are created when wastewater effluent contains ammonia and is then disinfected with chlorine, which is the case at the SRWTP.

(10) The Discharger must fully comply with Resolution No. 68-16 that requires Best Practical Treatment and Control, which for this discharge includes nitrification and denitrification of their wastewater.

(11) The mixing zone requirement for the SIP are not met for ammonia:

a. Compromise the integrity of the entire water body;

b. Adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or state endangered species laws; and

c. Produce undesirable or nuisance aquatic life.

(d) WQBELs. The Central Valley Water Board calculates WQBELs in accordance with SIP procedures for non-CTR constituents, and ammonia is a non-CTR constituent. The SIP procedure assumes a 4-day averaging period for calculating the long-term average discharge condition (LTA). However, USEPA recommends modifying the procedure for calculating permit limits for ammonia using a 30-day averaging period for the calculation of the LTA corresponding to the 30-day CCC. Therefore, while the LTAs corresponding to the acute and 4-day chronic criteria were calculated according to SIP procedures, the LTA corresponding to the 30-day CCC was calculated assuming a 30-day averaging period. The lowest LTA representing the acute, 4-day CCC, and 30-day CCC is then selected for deriving the average monthly effluent limitation (AMEL) and the maximum daily effluent limitation (MDEL). The remainder of the WQBEL calculation for ammonia was performed according to the SIP procedures. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for ammonia of 1.8 mg/L and 2.2 mg/L, respectively, based on the NAWQC ammonia criteria for aquatic toxicity with no dilution credit.

(e) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 45 mg/L is greater than the applicable WQBELs. See Table F-20. Performance-based Effluent Limitations Statistics. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is not feasible and appears to put the Discharger in immediate non-compliance with the ammonia final effluent limitations. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. The Discharger submitted an infeasibility analysis dated August 2010. As discussed in section IV.E of this Fact Sheet, a compliance schedule has been included in this Order for ammonia.

iii. **Bis(2-ethylhexyl) phthalate**

(a) **WQO.** The CTR includes a criterion of 1.8 µg/L for bis(2-ethylhexyl) phthalate for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** The maximum effluent concentration (MEC) for bis(2-ethylhexyl) phthalate was 8.1 µg/L out of 87 samples while the maximum observed upstream receiving water concentration was 0.58 µg/L out of 55 samples. Therefore, bis(2-ethylhexyl) phthalate in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** The receiving water contains assimilative capacity for bis(2-ethylhexyl) phthalate, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for bis(2-ethylhexyl) phthalate . Based on the allowable dilution credit, an AMEL of 94 µg/L and a MDEL of 180 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilative capacity of bis(2-ethylhexyl) phthalate and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (see See Table F-20. Performance-based Effluent Limitations Statistics.). This Order contains a final maximum daily effluent limitation (MDEL) for bis(2-ethylhexyl) phthalate of 13 µg/L.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 8.1 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

iv. **Carbon Tetrachloride**

(a) **WQO.** The CTR includes a criterion of 0.25 µg/L for carbon tetrachloride for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** The Discharger collected 101 samples during this time period resulting in 95 non-detect samples (i.e., ranging from <0.06 µg/L to <0.5 µg/L), three J-flagged estimates of 0.1 µg/L, 0.1 µg/L, and 0.2 µg/L, and three samples above the reporting level at 0.5 µg/L, 1.4 µg/L, and 1.7 µg/L. Therefore, carbon tetrachloride in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** The receiving water contains assimilative capacity for carbon tetrachloride, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for carbon tetrachloride. Based on the allowable dilution credit, an AMEL of 9 µg/L and a MDEL of 17 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of carbon tetrachloride and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-20. Performance-based Effluent Limitations Statistics). This Order contains a maximum daily effluent limitation (MDEL) for carbon tetrachloride of 5.3 µg/L.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 1.7 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

v. **Dibenzo(ah)anthracene**

(a) **WQO.** The CTR includes a criterion of 0.0044 µg/L for dibenzo(ah)antracene for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** The maximum effluent concentration (MEC) for dibenzo(ah)anthracene was 0.51 µg/L with only one out of 117 samples showing detection while the maximum observed upstream receiving water concentration was 0.0026 µg/L with one detected sample and a J-flagged sample out of 23 samples showing detection. The detection levels varied from 0.001 to10 µg/L. Therefore, dibenzo(ah)anthracene in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** Assimilative capacity within a water body is determined using detected and non-detected receiving water samples. Sampling for dibenzo(ah)anthracene was conducted between January 1998 to July 2008. Several analytical laboratory methods were used to detect dibenzo(ah)anthracene with MDLs varying from 10 µg/L to 0.00029 µg/L. To determine assimilative capacity the detected and non-detected sample concentrations are averaged and the averaged number is subtracted from the water quality criterion. If all the non-detected samples are used in determined assimilative capacity calculations then no assimilative capacity for dibenzo(ah)anthracene exists in the receiving water. However, this calculation may not provide an accurate assessment of assimilative capacity. Since October 2003 EPA method 625 with a MDL of 0.001 µg/L was used to determine if dibenzo(ah) anthracene was detected in the receiving water. One sample was detected with a J-flagged estimate of 0.0021 µg/L. Using 23 samples with EPA method 625 to determine assimilative capacity for dibenzo(ah)anthracene appears to be reasonable without using the samples with greater MDLs. The receiving water contains assimilative capacity for dibenzo(ah)anthracene, therefore, a dilution credit of 56:1 based on the harmonic mean of the river flow was allowed in the development of the WQBELs for dibenzo(ah)anthracene. Based on the allowable dilution credit, an AMEL of 0.2 µg/L and a MDEL of 0.4 µg/L is calculated. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for dibenzo(ah)anthracene of 0.2 µg/L and 0.4 µg/L, respectively, based on the CTR criterion for the protection of human health.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 0.51 µg/L is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for dibenzo(ah)anthracene are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the dibenzo(ah)anthracene effluent limitations is established in TSO No. R5-2010-0115 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

vi. **Chlorodibromomethane**

(a) **WQO.** The CTR includes a criterion of 0.41 µg/L for chlorodibromomethane for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** The maximum effluent concentration (MEC) for chlorodibromomethane was 0.7 µg/L out of 73 samples while the maximum observed upstream receiving water concentration was not detected out of 44 samples at a MDL of <0.18 µg/L. Therefore, chlorodibromomethane in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** The receiving water contains assimilative capacity for chlorodibromomethane, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for chlorodibromomethane. Based on the allowable dilution credit, an AMEL of 12 µg/L and a MDEL of 25 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of chlorodibromomethane and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-20. Performance-based Effluent Limitations Statistics). This Order contains a maximum daily effluent limitation (MDEL) for chlorodibromomethane of 2.2 µg/L.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 0.7 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

vii. Dichlorobromomethane

(a) **WQO.** The CTR includes a criterion of 0.56 µg/L for dichlorobromomethane for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** The maximum effluent concentration (MEC) for dichlorobromomethane was 2.5 µg/L out of 73 samples while the maximum observed upstream receiving water concentration was not detected out of 44 samples at a MDL of <0.14 µg/L. Therefore, dichlorobromomethane in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** The receiving water contains assimilative capacity for dichlorobromomethane, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for dichlorobromomethane. Based on the allowable dilution credit, an AMEL of 27 µg/L and a MDEL of 47 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of dichlorobromomethane and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-20. Performance-based Effluent Limitations Statistics). The performance-based effluent MDEL is 3.4 µg/L. Using the performance-based limit for the MDEL provides protection of the drinking water beneficial use and meets the antidegradation policy of no increase in concentration of dichlorobromomethane discharged by the Facility. This Order contains a final MDEL for dichlorobromomethane of 3.4 µg/L.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 2.5 µg/L is less than the applicable WQBELs. The

Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

viii. **Methylene Chloride**

(a) **WQO.** The CTR includes a criterion of 4.7 µg/L for methylene chloride for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** The maximum effluent concentration (MEC) for methylene chloride was 5.4 µg/L out of 73 samples while the maximum observed upstream receiving water concentration was not detected out of 44 samples at MDL of <0.35 µg/L. Therefore, methylene chloride in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** Although the receiving water contains assimilative capacity for methylene chloride, the Discharger can immediately comply with the applicable WQBELs without dilution. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for methylene chloride of 4.7 µg/L and 11 µg/L, respectively, based on the CTR criterion for the protection of human health.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the effluent never exceeded the WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

ix. **N-nitrosodimethylamine**

(a) **WQO.** The CTR includes a criterion of 0.00069 µg/L for N-nitrosodimethylamine (NDMA) for the protection of human health for waters from which both water and organisms are consumed. NDMA is a highly mutagenic compound suspected of carcinogenic activity to the human body. NDMA is formed as a disinfection by-product from wastewater and chlorination. Historically, NDMA was used to make rocket fuel until contamination was found in air, soil and water. NDMA is produced currently only as a research chemical. Detection levels for NDMA are greater than the water quality criterion and can range from 0.002 µg/L to 30 µg/L. From June 2005 to July 2008, 15 percent of effluent samples detected NDMA at levels greater than the water criterion. However, this detection percentage may be underestimated since the detection levels for sampling effluent are often too high to detect low concentrations of NDMA. Similarly, the receiving water showed no detectable concentrations for NDMA, but the detection limits are too high to detect low concentrations. The California Department of Water Resources (DWR) is currently studying NDMA in the Sacramento-San

Joaquin Delta. Preliminary data shows NDMA has not been detected at Hood, eight miles downstream of the discharge on the Sacramento River. However, DWR did find the NDMA precursors significantly greater (i.e., 3 to 4 times) below the discharge compared with above the discharge[1]

(b) **RPA Results.** The maximum effluent concentration (MEC) for NDMA between June 2005-July 2008 was 0.044 µg/L (subsequently the MEC was 0.082 µg/L on 6 October 2008) out of 97 samples while the maximum observed upstream receiving water concentration was not detected out of 47 samples at a MDL of <0.01 µg/L. Therefore, NDMA in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** Although NDMA was not detected in the receiving water, the detection level for NDMA is greater than the water quality criterion. Therefore, there is no assimilative capacity, dilution credits are not allowed for development of the WQBELs for NDMA. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for NDMA of 0.00069 µg/L and 0.0014 µg/L, respectively, based on the CTR criterion for the protection of human health.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 0.0044 µg/L is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for NDMA are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the NDMA effluent limitations is established in **TSO** No. R5-2010-0115 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

x. Pentachlorophenol

(a) **WQO.** The CTR includes a criterion of 0.28 µg/L for pentachlorophenol for the protection of human health for waters from which both water and organisms are consumed.

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[1] "Investigation into the sources of nitrosamines and their precursors in the Sacramento-San Joaquin Delta, California", Carol L DiGiorgio, California Department of Water Resources, Municipal Water Quality Investigations Unit. Poster presented from 10 -11 August 2009.

(b) **RPA Results.** The maximum effluent concentration (MEC) for pentachlorophenol was 5.7 µg/L out of 87 samples while the maximum observed upstream receiving water concentration was 0.026 µg/L out of 60 samples. Therefore, pentachlorophenol in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** The receiving water contains assimilative capacity for pentachlorophenol, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for pentachlorophenol. Based on the allowable dilution credit, an AMEL of 12 µg/L and a MDEL of 24 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of pentachlorophenol and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-20. Performance-based Effluent Limitations Statistics). This Order contains a final MDEL for pentachlorophenol of 18 µg/L.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 5.7 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible

xi. Tetrachloroethylene

(a) **WQO.** The CTR includes a criterion of 0.8 µg/L for tetrachloroethylene for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** The maximum effluent concentration (MEC) for tetrachloroethylene was 0.9 µg/L out of 73 samples while the maximum observed upstream receiving water concentration was 0.21 µg/L out of 43 samples. Therefore, tetrachloroethylene in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** The receiving water contains assimilative capacity for pentachlorophenol, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for tetrachloroethylene. Based on the allowable dilution credit, an AMEL of 37 µg/L and a MDEL of 75 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of tetrachloroethylene and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-20. Performance-based Effluent Limitations Statistics). This Order contains a final MDEL for tetrachloroethylene of 4.4 µg/L.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 0.9 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

xii. **Copper**

(a) **WQO.** The CTR includes hardness-dependant criteria for the protection of freshwater aquatic life for copper. The criteria for copper are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentration to total concentrations. The USEPA default conversion factors for copper in freshwater of 0.96 for both the acute and the chronic criteria were used for the discharge.

(b) **RPA Results.** For the effluent, the applicable copper chronic criterion (maximum 4-day average concentration) is 7.7 µg/L and the applicable acute criterion (maximum (1-hour concentration) is 11 µg/L, as total recoverable, (see Table F-9, above). The MEC for total copper was 6.34 µg/L, based on data collected between June 2005 and July 2008. For the receiving water, the applicable copper chronic criterion is 3.0 µg/L and the applicable acute criterion is 4.0 µg/L, as total recoverable, based on a hardness of 26 mg/L (as $CaCO_3$), using USEPA default translators. The maximum observed upstream total copper concentration was 20.4 µg/L, based on data from 1992-2008. Based on this information, copper in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

(c) **WQBELs.** As discussed in Section IV.C.3.d.vi of the Fact Sheet, the Facility can meet end-of-pipe effluent limits for copper. Therefore, dilution credits have not been applied in the calculation of the WQBELs.

Using the acute and chronic ECAs for copper shown in Table F-9, above, this Order contains final Average Monthly Effluent Limitations (AMEL) and Maximum Daily Effluent Limitations (MDEL) for copper of 7.3 µg/L and 9.3 µg/L (total recoverable), respectively.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 6.7 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

xiii. **Cyanide**

(a) **WQO.** The CTR includes maximum 1-hour average and 4-day average criteria of 22 µg/L and 5.2 µg/L, respectively, for cyanide for the protection of freshwater aquatic life.

(b) **RPA Results.** The maximum effluent concentration (MEC) for cyanide was 10 µg/L while the maximum observed upstream receiving water concentration was 5.0 µg/L. Therefore, cyanide in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

(c) **WQBELs.** As discussed in Section IV.C.3.d.vi of the Fact Sheet, based on Facility performance acute aquatic life dilution is not needed and has not been allowed for cyanide. However, chronic aquatic life dilution may be allowed for cyanide. Based on results of the Discharger's dynamic model for compliance with the CTR criteria for cyanide at the edge of the chronic aquatic life mixing zone, MDEL of 22 µg/L, and an AMEL of 11 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of cyanide and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-20. Performance-based Effluent Limitations Statistics). This Order contains a maximum daily effluent limitation (MDEL) for cyanide of 11 µg/L.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 10 µg/L is less than the MDEL. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

xiv. Manganese

(a) **WQO.** The Secondary MCL – Consumer Acceptance Limit for manganese is 50 µg/L which is used to implement the Basin Plan's chemical constituent objective for the protection of municipal and domestic supply.

(b) **RPA Results.** The maximum effluent concentration (MEC) for dissolved manganese was 82 µg/L out of 34 samples while the maximum observed upstream receiving water concentration was 5 µg/L out of 7 samples. Therefore, manganese in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the secondary MCL.

(c) **WQBELs.** The receiving water contains assimilative capacity for manganese, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for manganese. Based on the allowable dilution credit, an annual average effluent limit of 2700 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of manganese and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-20. Performance-based Effluent Limitations

Statistics). The performance-based annual average effluent limit is 85 µg/L. This Order contains MDEL for manganese of 85 µg/L.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 82 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

xv. **Methyl Tertiary Butyl Ether (MTBE)**

(a) **WQO.** The Secondary MCL – Consumer Acceptance Limit for MTBE is 5.0 µg/L, which is used to implement the Basin Plan's chemical constituent objective for the protection of municipal and domestic supply.

(b) **RPA Results.** The maximum effluent concentration (MEC) for methyl tertiary butyl ether (MTBE) was 5.8 µg/L out 101 samples while the maximum observed upstream receiving water concentration was 1.9 µg/L out of 30 samples. Therefore, MTBE in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the secondary MCL.

(c) **WQBELs.** The receiving water contains assimilative capacity for MTBE, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for MTBE. Based on the allowable dilution credit, an annual average effluent limit of 260 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of MTBE and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-20. Performance-based Effluent Limitations Statistics). This Order contains MDEL for MTBE of 18 µg/L.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 5.8 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

xvi. **Chlorine Residual**

(a) **WQO.** USEPA developed NAWQC for protection of freshwater aquatic life for chlorine residual. The recommended 4-day average (chronic) and 1-hour average (acute) criteria for chlorine residual are 0.011 mg/L and 0.019 mg/L, respectively. These criteria are protective of the Basin Plan's narrative toxicity objective.

(b) **RPA Results.** The Discharger uses chlorine for disinfection, which is extremely toxic to aquatic organisms. The Discharger uses a sulfur dioxide process to dechlorinate the effluent prior to discharge to

Sacramento River. Due to the existing chlorine use and the potential for chlorine to be discharged, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the NAWQC.

(c) **WQBELs.** The USEPA Technical Support Document for Water Quality-Based Toxics Control [EPA/505/2-90-001] contains statistical methods for converting chronic (4-day) and acute (1-hour) aquatic life criteria to average monthly and maximum daily effluent limitations based on the variability of the existing data and the expected frequency of monitoring. However, because chlorine is an acutely toxic constituent that can and will be monitored continuously, an average 1-hour limitation is considered more appropriate than an average daily limitation. This Order contains a 4-day average effluent limitation and 1-hour average effluent limitation for chlorine residual of 0.011 mg/L and 0.019 mg/L, respectively, based on USEPA's NAWQC, which implements the Basin Plan's narrative toxicity objective for protection of aquatic life.

(d) **Plant Performance and Attainability.** Although, the Discharger violated the chlorine residual limit twice since June 2005, the Central Valley Water Board believes that immediate compliance with these effluent limitations is feasible.

xvii. **Chlorpyrifos and Diazinon**

(a) **WQO.** The Central Valley Water Board recently completed a total maximum daily load (TMDL) for chlorpyrifos and diazinon in the Sacramento and Feather Rivers and amended the Basin Plan to include chlorpyrifos and diazinon waste load allocations and water quality objectives on 23 June 2006. The Basin Plan contains water quality objectives for chlorpyrifos of 0.025 µg/L as a 1-hour average and 0.015 µg/L as a 4-day average for the Sacramento River from the Colusa Basin Drain to the I Street Bridge. The Basin Plan also states that "Compliance with water quality objectives, waste load allocations, and load allocations for diazinon and chlorpyrifos in the Sacramento and Feather Rivers is required by August 11, 2008"

(b) **RPA Results.** The maximum effluent concentration (MEC) for chlorpyrifos was 0.039 µg/L while the maximum observed upstream receiving water concentration was 0.006 µg/L. Therefore, chlorpyrifos in the discharge has reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's water quality objective for chlorpyrifos. Diazinon has not be detected in the effluent.

(c) **WQBELs.** The waste load allocations (WLA) for chlorpyrifos and diazinon have been adopted as water quality objectives in the Basin Plan. NPDES dischargers must meet the WLA, therefore, no dilution can be granted for compliance with the water quality objectives for chlorpyrifos and diazinon. Due to the additive toxicity of chlorpyrifos and diazinon, the Basin Plan established that the WLA for all NPDES-permitted dischargers shall not exceed the sum (S) of one (1) as defined below."

$$S = \frac{C_D}{WQO_D} + \frac{C_C}{WQO_C} \leq 1.0$$

Where:

C_D = diazinon effluent concentration in µg/L
C_C = chlorpyrifos effluent concentration in µg/L
WQO_D = acute or chronic diazinon water quality objective in µg/L.
WQO_C = acute or chronic chlorpyrifos water quality objective in µg/L.

Average monthly effluent limits and maximum daily effluent limits have been calculated using the procedures in Section 1.4 of the SIP resulting in the following effluent limits for chlorpyrifos and diazinon:

Average Monthly Effluent Limit

$$S_{AMEL} = \frac{C_{D\text{-}avg}}{0.08} + \frac{C_{C\text{-}avg}}{0.012} \leq 1.0$$

$C_{D\text{-}avg}$ = average monthly diazinon effluent concentration in µg/L
$C_{C\text{-}avg}$ = average monthly chlorpyrifos effluent concentration in µg/L

Maximum Daily Effluent Limit

$$S_{MDEL} = \frac{C_{D\text{-}max}}{0.16} + \frac{C_{C\text{-}max}}{0.025} \leq 1.0$$

$C_{D\text{-}max}$ = maximum daily diazinon effluent concentration in µg/L
$C_{C\text{-}max}$ = maximum daily chlorpyrifos effluent concentration in µg/L

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 0.039 µg/L is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for chlorpyrifos are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the chlorpyrifos effluent limitations is established in TSO No. R5-2010-0115 in accordance with

CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

xviii. Mercury

(a) WQO. The Central Valley Water Board adopted Resolution No. R5-2010-0043 on 22 April 2010, Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and total mercury in the Sacramento-San Joaquin Delta Estuary. The methylmercury amendment adopts an implementation plan for limiting methylmercury discharged by point sources, including the Discharger. Phase I of the amendments requires a performance limit based on the 99.9 percentile of 12-month running effluent inorganic (total) mercury loads (lbs/year). Additionally, the amendments assign wastewater methylmercury (MeHg) allocations, for the Discharger, the load allocation is 89 g/year as described in Table B – Municipal and Industrial Wastewater Methylmercury (MeHg) Allocations, Attachment 1 of the amendments.

The current NAWQC for protection of freshwater aquatic life, continuous concentration, for mercury is 0.77 µg/L (30-day average, chronic criteria). The CTR contains a human health criterion (based on a threshold dose level causing neurological effects in infants) of 0.050 µg/L for waters from which both water and aquatic organisms are consumed. Both values are controversial and subject to change. In 40 CFR Part 131, USEPA acknowledges that the human health criteria may not be protective of some aquatic or endangered species and that "*...more stringent mercury limits may be determined and implemented through use of the State's narrative criterion.*" In the CTR, USEPA reserved the mercury criteria for freshwater and aquatic life and may adopt new criteria at a later date.

(b) RPA Results. According to the April 2010 Delta methylmercury TMDL staff report, during water years 2000-2003 and the mercury TMDL staff, SRCSD contributed an annual average methylmercury load of 162 g/yr to the Delta. The March 2008 SRCSD Localized Bioaccumulation Study determined that SRCSD's effluent contributes about the same amount of methylmercury to bioaccumulation in the Sacramento River as expected from effluent and river methylmercury load estimates. SRCSD's discharge during the field work (July-November 2006, a low flow period during an overall wet year) represented about 1.5% of the flow and about 7% of the methylmercury load in the Sacramento River. Mercury in short-lived biosentinel fish (silversides and juvenile bass) increased 9 to 13% downstream of the outfall, but longer-lived fish (prickly sculpin) decreased by 9%. The Study report stated, "There was a measurable (i.e., statistically significant) effect of SRWTP effluent on most bio-indicator organisms downstream of the outfall during low-flow river conditions that provide the least amount of dilution. But, the evidence of localized environmental risk is not so clear and convincing that a reasonable decision maker would conclude that some action must be taken locally." The evidence presented in this report argues that an offset program "is acceptable for addressing the regional problem of mercury levels in fish." SRCSD methylmercury loading to the Sacramento River has generally decreased during the last several years. However, SRCSD has contributed as much as 20 to 30% of loading to the river at peak times during drier periods when effluent methylmercury concentrations were higher, and could make similarly substantial contributions during future dry periods, especially if SRCSD increases its discharge.

The maximum observed effluent mercury concentration was 0.0106 µg/L. Mercury bioaccumulates in fish tissue and, therefore, the discharge of mercury to the receiving water may contribute to exceedances of the narrative toxicity objective and impact beneficial uses. The Sacramento-San Joaquin Delta has been listed as an impaired water body pursuant to CWA section 303(d) because of mercury and the discharge must not cause or contribute to increased mercury levels.

(c) **WQBELs.** This Order contains a performance-based mass effluent limitation of 2.3 lbs/year for total mercury for the effluent discharged to the receiving water. The mass limitation was derived in accordance with the Delta Methylmercury TMDL (The 99.9th percentile of running annual total mercury loading based on effluent data from January 2005 through April 2010.) Order No. 5-00-188 prescribed a mercury mass load limit and a mercury "credit" program. The Discharger discharged less than the prescribed load limit, so has accumulated mercury discharge credits. Since this permit establishes a performance-based mercury limit with which the discharger can comply, the accumulated credit is not applied against future discharges under this Order.

(d) **Plant Performance and Attainability.** The new effluent limitation for mercury is based on the performance of the Facility, therefore, immediate compliance can be achieved.

xix. Nitrate and Nitrite

(a) **WQO.** DPH has adopted Primary MCLs for the protection of human health for nitrite and nitrate that are equal to 1 mg/L and 10 mg/L (measured as nitrogen), respectively. DPH has also adopted a primary MCL of 10 mg/L for the sum of nitrate and nitrite, measured as nitrogen.

USEPA has developed a primary MCL and an MCL goal of 1 mg/L for nitrite (as nitrogen). For nitrate, USEPA has developed Drinking Water Standards (10 mg/L as Primary MCL) and NAWQC for protection of human health (10 mg/L for non-cancer health effects). Recent toxicity studies have indicated a possibility that nitrate is toxic to aquatic organisms.

(b) **RPA Results.** Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. Nitrate and nitrite are known to cause adverse health effects in humans. Inadequate or incomplete denitrification may result in the discharge of nitrate and/or nitrite to the receiving stream. The conversion of ammonia to nitrites and the conversion of nitrites to nitrates present a reasonable potential for the discharge to cause or contribute to an in-stream excursion above the Primary MCLs for nitrite and nitrate.

Currently, the Discharger's effluent contains very low concentrations of nitrate, ranging from 0.016 to 1.4 mg/L with an average of 0.13 mg/L. However, this Order requires the Discharger fully nitrify its effluent, therefore, the ammonia will convert to nitrate and the nitrate concentrations will increase. Therefore, the discharge has reasonable potential to cause or contribute to an exceedance of the water quality objectives for nitrite and nitrate in the receiving water.

(c) **WQBELs.** As discussed in Section IV.C.2.d no dilution is allowed for nitrate. Therefore, this Order requires the wastewater is denitrified to meet the primary MCL at the end-of-pipe. An average monthly effluent limit of 10 mg/L for nitrate (as nitrogen) is included in this Order. This is based on the primary MCL of 10 mg/L (as N).

(d) **Plant Performance and Attainability.** Analysis of the effluent data demonstrates that the Facility can immediately comply with the new WQBELs for nitrate.

xx. Pathogens

(a) **WQO.** DPH has developed reclamation criteria, CCR, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, schoolyards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent total coliform levels not exceed 2.2 MPN/100 mL as a 7-day median. As coliform organisms are living and mobile, it is impracticable to quantify an exact number of coliform organisms and to establish weekly average limitations. Instead, coliform organisms are measured as a most probable number and regulated based on a 7-day median limitation.

Title 22 also requires that recycled water used as a source of water supply for non-restricted recreational impoundments be disinfected tertiary recycled water that has been subjected to conventional treatment. A non-restricted recreational impoundment is defined as "*...an impoundment of recycled water, in which no limitations are imposed on body-contact water recreational activities.*" Title 22 is not directly applicable to surface waters; however, the Central Valley Water Board finds that it is appropriate to apply an equivalent level of treatment to that required by the Department of Public Health's reclamation criteria because the receiving water is used for irrigation of agricultural land and for contact recreation purposes. The stringent disinfection criteria of Title 22 are appropriate since the partially diluted effluent may be used for the irrigation of food crops and/or for body-contact water recreation. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens.

(b) **RPA Results.** The beneficial uses of the Sacramento-San Joaquin Delta include municipal and domestic supply, water contact recreation, and agricultural irrigation supply. To protect these beneficial uses, the Central Valley Water Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The method of treatment is not prescribed by this Order; however, wastewater must be treated to a level equivalent to that recommended by DPH.

Pathogens include bacterium, viruses and protozoans, which exist in natural waters and wastewater. Pathogens are difficult to detect, because of the typically low abundance in most waters. Therefore, indicator bacteria (e.g., total coliform organisms) are used as a barometer of pathogen water quality. NPDES permits include total coliform limitations to measure the effectiveness of disinfection processes. Specific protozoans of concern for the Central Valley Drinking Water Group are *Giardia* and *Cryptospordium* from human and animal fecal waste. Both protozoans are in municipal wastewater and can cause diarrhea, vomiting and cramps. For immune suppressed individuals, the illness can be very serious, including death.

The Sacramento River near the diffuser is a popular sport fishing area[1]. In addition, there are at least 20 agricultural diversions within 1 mile upstream and 2 miles downstream of the discharge[2]. Based upon information submitted by SRCSD, the typical construction of the agricultural irrigation water intakes in the vicinity of the outfall would draw water from near the bank of the river, below the water surface (deep enough to not go dry during low river levels, but far enough from the river

[1] "Localized Mercury Bioaccumulation Study", Larry Walker Associates, March 2008, Figure ES-1.

[2] NPDES Permit Renewal Issues – Drinking Water Supply and Public Health, SRWTP, 14 December 2009, CVRWQCB

bottom to not be impacted by bottom sediments). It appears that undiluted effluent will not be drawn into the agricultural intakes, but varying mixtures of effluent and river water will be diverted from the partially mixed discharge plume. The nearest drinking water intake is approximately one mile upstream at the new Freeport water intake. River flow modeling conducted by SRCSD concluded that the SRCSD discharge will not be carried far enough upriver during incoming tides to be captured by the Freeport intake, however an operating agreement between the East Bay Municipal Utility District and SRCSD will prevent diversion of river water possibly containing diluted treated wastewater at the Freeport water intake. The diffuser for the discharge to the Sacramento River is located in the vicinity of many agricultural water intakes and an area popular with fishermen.

The Central Valley Water Board generally follows a November 1980 general recommendations by the Department of Public Health (DPH) on the appropriate levels of disinfection for protection of body-contact recreation in waters downstream of a sewage treatment plant discharge. The general DPH recommendation allows a discharge of secondary treatment with chlorination when there is a minimum of 20-to-1 dilution (river to discharge), and suggests tertiary filtration when less than 20-to-1 dilution is available. The DPH recommendations are a "rule of thumb" and are not regulation. Site-specific disinfection recommendations are often sought from DPH in preparing NPDES permits.

Even when the 20-to-1 "rule of thumb" is followed, the available dilution often far exceeds a 20-to-1 river to discharge flow ratio. The dilution ratio for the District's discharge is typically greater than 20-to-1, but can be at times less than 20:1. The following is a list of all municipal sewage treatment plant discharges to the Sacramento River downstream of Shasta Dam and the associated average dilution ratios (river-to-effluent). As noted, some of these treatment facilities have a tertiary filtration process preceding the disinfection process, which reduces the pathogen concentrations, although the filtration systems themselves are not designed and operated to produce a pathogen-free effluent (i.e. Title 22, or equivalent, filtration system).

Facility	Permitted Flow	Average Dilution
Sacramento Regional CSD WWTP (no filtration)	**181 mgd**	**50-to-1**
City of Redding Stillwater WWTP (filtered)	4 mgd	1200-to-1
City of Redding Clear Creek WWTP (filtered)	8.8 mgd	600-to-1
City of Corning WWTP (no filtration)	1.4 mgd	4100-to-1
City of Anderson WWTP (filtered)	1.4 mgd	2400-to-1
City of Rio Vista Beach WWTP (no filtration)	0.65 mgd	10,000-to-1
City of Chico WWTP (no filtration)	12 mgd	400-to-1
City of Red Bluff WWTP (filtered)	2.5 mgd	2600-to-1

Due to site-specific circumstances of the discharge to the Delta being a major drinking water supply and the high degree of direct public contact with the river at the point of discharge and downstream of the point of discharge, the Central Valley Water Board staff sought a recommendation of DPH rather than rely on the 1980 general recommendation. In a 11 May 2009 letter to the DPH, Central Valley Water Board staff requested guidance on the appropriate disinfection requirements for the removal of pathogens in the renewed NPDES permit for protection of beneficial uses for contact recreation and agricultural irrigation. Central Valley Water Board staff also requested DPH's advice on whether the Discharger's chlorine disinfection system would be expected to provide adequate disinfection to kill pathogenic organisms. Furthermore, Central Valley Water Board staff requested guidance on whether Dr. Robert Emerick's[1] research that the Discharger's effluent had high (20) percent of coliform associated particles could be under estimating the pathogenic risk of the discharge. This concern is due to the fact that the multiple-tube fermentation test used to measure the total coliform organisms in the effluent does not adequately enumerate target organisms that occur in a particle-associated state.

DPH requested a formal health risk assessment be conducted to determine the risk of *Giardia* cysts and *Cryptosporidium* oocysts might pose to persons engaging in body contact recreation in the portions of the Sacramento River affected by the discharge. DPH determined that if contact recreation is protected then agricultural irrigation and other Delta beneificial uses that could be impacted by pathogens would also be protected.

The Discharger engaged the professional services of Dr. Charles Gerba of the University of Arizona to conduct the human health risk assessment. The assessment determined the risk to pathogenic protozoans nearly quadruples from upstream of the discharge to downstream of the discharge. Dr. Gerba's risk assessment concluded that SRWTP discharge did not exceed the USEPA's water quality criteria for contact recreation. Based on Dr. Gerba's "Estimated Risk of Illness from Swimming in the Sacramento River", 23 February 2010, the DPH recommended in a letter dated, 15 June 2010, to Central Valley Water Board that the Discharger provide "additional treatment sufficient to reduce the additional risk of infection posed by exposure to its discharge to as close to 1 in 10,000 as can be achieved by a cost-effective combination of using filtration and/or a disinfection process that effectively inactivates *Giardia* cysts and *Cryptosporidium* oocysts". DPH concluded that providing additional treatment would also address the concerns with

[1] Emerick, Robert W., Factors Influencing Ultraviolet Disinfection Performance Part II: Association of Coliform Bacteria with Wastewater Particles, Water Environment Research, Volume 71, Number 6, 2000.

the lack of a chlorine contact chamber as well as particle-associated coliform in the SRWTP's effluent.

The Discharger disagreed with the DPH in a letter to the Central Valley Water Board dated and 30 June 2010. The Discharger contended:

(1) Risk levels due to Cryptosporidium and Giardia in the Sacramento River do not show a statistically significant difference between upstream of the discharge and immediately downstream of the discharge, however, minor statistically significant change in risk is determined 1.5 miles downstream of the discharge and may be due to other impacts.
(2) DPH's risk of 1 in 10,000 is contrary to 1986 USEPA's national risk criteria of 8 illnesses in 1,000 exposures.
(3) DPH's contention that the 1986 criteria for contact recreational use protection are outdated or did not consider human pathogens is incorrect.
(4) Dr. Gerba's assumptions are very conservative and changing just one assumption would reduce the risk to less than 1 in 10,000.
(5) DPH's recommendation is establishing a new unadopted standard that exceeds requirements for other NPDES permits.

SRCSD recommends, instead, that the USEPA Beach Standard[1] for freshwater recreational exposure of 8 illnesses per 1000 exposures, be used as the level of human health protection. SRCSD additionally states that the discharge does not create a health risk greater than the USEPA Beach Standard.

The USEPA Beach Standard is not an appropriate or applicable standard for the discharge of treated sewage, a controllable source of pathogens. In the Forward of the Beach Standards, the then Director of the USEPA Criteria and Standards Division states: "The bacteriological water quality criteria recommended in this document are based on an estimate of bacterial indicator counts and gastrointestinal illness rates that are currently being accepted, albeit unknowingly, in many circumstances, by the States." The Beach Standard of 8 illnesses for 1000 exposures is not a policy of USEPA nor does it state that this is an acceptable rate of illness. It is instead a recognition that there is a health risk associated with recreational use of freshwaters, even when those waters in and of themselves are considered to be free of health risk. Wildlife, non-point source discharges, and the recreationists themselves, all contribute pathogens to the freshwaters used for recreation. If a controllable sewage treatment plant discharge is allowed to add pathogens to a receiving water such that the health risk is at the USEPA Beach Standard, the uncontrollable sources and contribution of pathogens from wildlife, non-

[1] "Ambient Water Quality Criteria for Bacteria – 1986" EPA 440/5-84-002, January 1986

point source pollution, and the recreationalists, will cause the overall health risk to exceed the 8 illness per 1000 exposures. If the Beach Standard is applied to the SRCSD discharge, under the most critical river conditions, the SRCSD discharge would cause nearly 1 of every 100 people ingesting river water during recreation to become ill from pathogens in the SRCSD discharge, which is in addition to any contribution of health risk from other sources.

Given the very high level of public contact with the receiving water, the use of the receiving water for irrigation which can result in human contact with pathogens, and extensive use of Delta waters as private and public water supplies, any increased risk of illness and infection from exposure to the wastewater is not protective of the municipal, agricultural or recreational beneficial use. This permit requires an essentially pathogen-free wastewater, which will incidentally implement DPH's recommendation to improve the level of disinfection to remove protozoa in addition to bacteria, enteric virus and other pathogens. Several technologies are available to achieve this, all essentially involving filtration to produce a very low-solids effluent, which is then dosed with a disinfectant (usually chlorine or UV light). The combination of filtration and disinfectant effectively removes all pathogens. Requirements of Title 22 will be adequate to meet the 1 in 10,000 risk and 1 log removal recommended by the DPH.

In addition to protecting the beneficial uses of agricultural irrigation and contact recreation, filtration will also reduce total organic carbon (TOC), a constituent of concern for the Drinking Water Advisory Group, and substantial reductions in effluent concentrations for copper, mercury, TSS and BOD. BOD is a concern due to its oxygen demand to the Sacramento River. Improved effluent treatment may also reduce concentrations of other constituents, such as Constituents of Emerging Concern (CECs), although whether or not reductions of these chemicals do occur, and the magnitude of any such reductions, is unknown at this time. Similar POTWs that implement tertiary treatment and discharge to the Sacramento-San Joaquin Delta or its tributaries include:

Community of El Dorado Hills	City of Roseville
City of Manteca	City of Woodland
City of Stockton	City of Placerville
City of Lodi	Community of Colfax
City of Galt	Live Oak
City of Tracy	Community of Mountain House
City of Rio Vista, Northwest Plant	Linda County Water District

The health risk study conducted by SRCSD focused on pathogen impacts from body contact recreation because that was determined, through consultation with DPH, that recreational contact with the Sacramento River has the highest degree of water contact and risk of illness. If contact recreation is fully protected from pathogen risk, other beneficial uses will also be protected. There are other beneficial uses that can be impacted by pathogens in the SRCSD discharge.

- Agricultural irrigation beneficial use. Some crops, such as strawberries and carrots, can transmit pathogens in the irrigation water to human consumers. Irrigation water intakes in the immediate vicinity of the discharge are not an issue because the irrigation water is drawn from the sides of the river outside of the SRCSD mixing zone, so those agricultural irrigation diversions contain no SRCSD wastewater. Any agricultural diversion more than a mile or so downstream of the discharge point will contain some amount of SRCSD discharge and the pathogens in the discharge. For any agricultural irrigation with water containing SRCSD discharge, there is an increased pathogen loading onto the crops due the SRCSD discharge. No specific study was conducted to quantify this health risk. However, tertiary filtration to remove pathogens will eliminate this increased health risk.

- Drinking Water (MUN) beneficial use. The Sacramento River and Delta downstream of the SRCSD discharge are used extensively for municipal and domestic drinking water supply. The raw water supply for these drinking water systems contains increased concentrations of pathogens as the result of SRCSD's existing discharge, although the health risk caused by the increased pathogen concentrations has not been studied. Municipal drinking water intakes that provide full drinking water treatment required by State and Federal regulations should be able to remove the increased pathogens without a health risk to the consumers. However, there are small drinking water systems throughout the Delta that are not legally required to meet these State and Federal regulations, and so may not have treatment systems that can dependably remove the pathogens. Additionally, there can be incidental drinking of raw Delta water by the public.

(c) **WQBELs.** In accordance with the requirements of Title 22, this Order includes effluent limitations for total coliform organisms of 2.2 MPN/100 mL as a 7-day median; 23 MPN/100 mL, not to be exceeded more than once in a 30-day period; and 240 MPN/100 mL as an instantaneous maximum.

In addition to coliform limitations, a turbidity specification has been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The tertiary treatment process, or equivalent, is capable of reliably meeting a turbidity of 2 nephelometric turbidity units (NTU) as a daily average. Failure of the filtration system such that virus removal is impaired would normally result in increased particles in the effluent, which result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours, to days, to identify high coliform concentrations. To ensure compliance with the DPH Title 22 disinfection criteria, this Order contains operational turbidity specifications to be met prior to disinfection.

This Order contains effluent limitations and requires a tertiary level of treatment, or equivalent, necessary to protect the beneficial uses of the receiving water. The Regional Water Board has considered the following factors in CWC section 13241:

(1) The past, present and probable future beneficial uses of the Sacramento River and Delta include municipal and domestic supply, agricultural irrigation, agricultural stock watering, industrial process water supply, industrial service supply, body contact water recreation, other non-body contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, wildlife habitat, and navigation.

(2) The environmental characteristics of the hydrographic unit, including the quality of the available water, will be improved by the requirement to provide tertiary treatment for this wastewater discharge. Tertiary treatment will allow for the reuse of the diluted wastewater for food crop irrigation and contact recreation activities that would otherwise be unsafe according to recommendations from DPH.

(3) Fishable and swimmable water quality conditions can be reasonably achieved through the coordinated control of all factors that affect water quality in the area. These factors include regulation of point source municipal and industrial discharges with appropriate NPDES Permits, regulation of urban storm water runoff with Municipal Storm water NPDES Permits, and non-point source discharges such as timber harvesting and irrigated agriculture. All of these regulatory programs control the discharge of pollutants to surface waters to protect existing and potential beneficial uses.

(4) The economic impact of requiring an increased level of treatment has been considered. The Discharger and others have estimated that the increased level of treatment will cost approximately between $500 million to $1.3 billion. The loss of beneficial uses within downstream waters, without the tertiary treatment requirement, which includes prohibiting the irrigation of food crops and prohibiting public access for contact recreational purposes, would have a detrimental economic impact. In addition to pathogen removal to protect irrigation and

recreation, tertiary treatment may also aid in meeting discharge limitations for other pollutants, such as heavy metals, reducing the need for advanced treatment specific for those pollutants.

(5) The requirement to provide tertiary treatment for this discharge will not adversely impact the need for housing in the area any more than for other adjacent communities. The potential for developing housing in the area will be facilitated by improved water quality, which protects the contact recreation and irrigation uses of the receiving water. DPH recommends that, in order to protect the public health, diluted wastewater effluent must be treated to a tertiary level for contact recreational and food crop irrigation uses. Without tertiary treatment, the downstream waters could not be safely utilized for contact recreation or the irrigation of food crops.

(6) It is the Regional Water Board's policy, (Basin Plan, page IV-12.00, Policy 2) to encourage the reuse of wastewater. The Regional Water Board requires dischargers to evaluate how reuse or land disposal of wastewater can be optimized. The need to develop and use recycled water is facilitated by providing a tertiary level of wastewater treatment that will allow for a greater variety of uses in accordance with CCR, Title 22.

(7) The Regional Water Board has considered the factors specified in CWC section 13263, including considering the provisions in CWC section 13241, in adopting the disinfection and filtration requirements under Title 22 criteria. The Regional Water Board finds, on balance, that these requirements are necessary to protect the beneficial uses of the Sacramento River and Delta, including water contact recreation and irrigation uses.

(d) Plant Performance and Attainability. New or modified control measures will be necessary in order to comply with the effluent limitations for total coliform organisms, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for filtration are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. The Discharger submitted an infeasibility analysis dated August 2010 for compliance with these disinfection requirements. Therefore, a compliance time schedule for compliance with the total coliform organisms effluent limitations and a requirement to provide Title 22 (or equivalent) tertiary filtration is established in this Order.

xxi. pH

(a) WQO. The Basin Plan includes a water quality objective for surface waters (except for Goose Lake) that the "...pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses."

(b) RPA Results. The discharge of domestic wastewater has a reasonable potential to cause or contribute to an excursion above the Basin Plan's numeric objectives for pH.

(c) WQBELs. Effluent limitations for pH of 6.0 as an instantaneous minimum and 8.0 as an instantaneous maximum are included in this Order. The instantaneous maximum effluent limit is more stringent than the Basin Plan objective and is based on Facility performance. Based on modeling performed by the Discharger, an instantaneous minimum effluent limit of 6.0 ensures compliance with the Basin Plan's minimum objective within the chronic mixing zone.

(d) Plant Performance and Attainability. Analysis of the effluent data demonstrates that the Facility can immediately comply with the effluent limitations for pH.

xxii. Settleable Solids

(a) WQO. For inland surface waters, the Basin Plan states that "[w]ater shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses."

(b) RPA Results. The discharge of domestic wastewater has a reasonable potential to cause or contribute to an excursion above the Basin Plan's narrative objective for settleable solids. The maximum effluent concentration (MEC) for settleable solids was 2.5 ml/L. Therefore, settleable solids in the discharge has reasonable potential to cause or contribute to an in-stream excursion above the narrative toxicity objective or Basin Plan numeric objectives and waste load allocation.

(c) WQBELs. This Order contains average monthly and average daily effluent limitations for settleable solids. Because the amount of settleable solids is measured in terms of volume per volume without a mass component, it is impracticable to calculate mass limitations for inclusion in this Order. A daily maximum effluent limitation for settleable solids is included in the Order, in lieu of a weekly average, to ensure that the treatment works operate in accordance with design capabilities.

(d) Plant Performance and Attainability. Only one violation of the settleable solids occurred since 2005. Therefore, based on existing performance the Facility can immediately comply with the new final WQBELs for settleable solids.

xxiii. Temperature

(a) WQO. The Thermal Plan requires that, "*The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F.*"

(b) RPA Results. The SRWTP discharges to the Sacramento River via a 400-foot outfall (300-foot diffuser with 74 ports) that is placed on the bottom of the river perpendicular to the river flow. The Sacramento River in the vicinity of the discharge is approximately 600 feet wide at the surface, about 400 feet wide at the bottom and 25 - 30 feet deep. The Sacramento River at the point of discharge experiences tidal flows that slow the river flow, and at times cause flow reversals. The existing NPDES permit adopted in 2000 (Order No. 5-00-188), prohibits river discharge when the flow ratio (Sacramento River: effluent) is less than 14:1. The existing permit also prohibits discharge when river flows are less than 1,300 cubic feet per second (cfs). These discharge prohibitions are based on the design of the outfall diffuser to ensure adequate mixing of effluent with river water. When either of these two conditions exists, the SRCSD ceases its surface water discharge and diverts treated effluent to storage basins.

The Lower Sacramento River and Delta serve as a migration corridor and/or provide other types of habitat (e.g., spawning, rearing) for many anadromous fish species. In addition, the lower Sacramento River supports numerous resident native and introduced fish species and diverse assemblage of BMIs, an important source for many adult and juvenile fishes. The following table lists those species of concern that may be impacted within the vicinity of the discharge:

Common Name	Scientific Name	Anadromous/ Resident	Status
Chinook salmon	Onocorhynchus Ishawytscha		
Fall-run	Onocorhynchus Ishawytscha	Anadromous	FSC
Late-fall run	Onocorhynchus Ishawytscha	Anadromous	CSC, FSC
Spring-run	Onocorhynchus Ishawytscha	Anadromous	ST, FT
Winter-run	Onocorhynchus Ishawytscha	Anadromous	SE, FE
Steelhead trout	O. mykiss	Anadromous	FT
Green sturgeon	Acipenser medirostros	Anadromous	FC, CSC/C1
Striped bass	Morone saxatills	Anadromous	I
American shad	Alsoa sapidissima	Anadromous	I
White sturgeon	A. transmontanus	Anadromous	N
River lamprey	Lampetra ayresi	Anadromous	CSC/C2
Pacific lamprey	L. tridentate	Anadromous	FSC
Hardhead	Mylopharidib conocephalus	Resident	CSC/C2
Splittail	Pogonichthys macrolepdiotus	Resident	CSC

Delta smelt	Hypomesus traspacificus	Resident	FT, SE
Status Codes	FE = Federally listed as endangered FT = Federally listed as threatened FSC = Federal Species of Concern SE = Listed as endangered by California N= Native species, no State or federal status	ST = Listed as threatened by California CSC= CA Species of Concern C1=Should be listed as threatened or endangered C2 = Declining, potentially threatened I= Introduced, no State or federal status	

As a condition of Waste Discharge Order No. 5-00-188, the Discharger completed and submitted a study assessing the thermal impacts of its discharge in the Sacramento River to the National Marine Fisheries Services (NMFS), titled "Thermal Effects of Sacramento Regional Wastewater Treatment Plant Discharges on Migrating Fishes of the Sacramento River, February 2005." This thermal impact assessment recommended continuation of the existing thermal plan exemptions. The 2005 Thermal Study was previously reviewed by NMFS staff and they did not indicate any concerns with the proposed Thermal Plan exception. Since this time, however, conditions under which the evaluation was made have changed. There has been a significant pelagic organism decline in the Delta, new species are threatened and there has been a change in the diffuser configuration. In December 2009, the Discharger requested revised changes to their Thermal Plan exemption. In June 2010, the Discharger in a letter to the Central Valley Water Board withdrew its request for an expanded wastewater treatment plant. Due to these changes the Discharger prepared a new study, "Thermal Plan Exception Justification for the Sacramento Regional Wastewater Treatment Plant", July 2010. With this revised July 2010 study, new thermal plan exemptions were requested.

Table F-16 below outlines the Thermal Plan requirements, the Thermal Plan exception allowed in the current NPDES permit, and the Discharger's most recent proposed Thermal Plan exception request for the NPDES permit renewal.

Table F-15. Existing and Proposed Thermal Plan Exception Requirements

Thermal Plan Requirements (Section 5.A.(1)a-c)	Existing NPDES Permit Requirements (181 mgd discharge)	SRCSD Proposed NPDES Requirements (181 mgd)
5.A.(1)a The maximum effluent temperature shall not exceed the natural receiving water temperature by more than 20°F	The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than: 25° F from 1 October through 30 April; -or- 20° F from 1 May through 30 September *(meets Thermal Plan requirements)*	The daily average temperature of the effluent shall not exceed the daily average natural receiving water temperature by more the 20°F 1 April through 30 September, or by more the 25°F 1 October through 31 March
5.A.(1)b Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than **1°F** above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.	If the natural receiving water temperature is less than 65° F: The discharge shall not create a zone, defined by water temperature of more than **2° F** above the natural receiving water temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution. If the natural receiving water temperature is 65° F or greater: Meets Thermal Plan requirements at any point outside the zone of initial dilution.	The discharge shall not create a zone, defined by water temperatures of more than 2.5°F above natural receiving water temperature, which exceeds 50 percent of the cross-sectional area of the river at any point, evaluated as a daily average.
5.A.(1)c No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.	No Exception (*Meets Thermal Plan Requirements)*	No Exception (*Meets Thermal Plan Requirements)*

The July 2010 thermal plan exception justification study is based on the dynamic model for temperature performed by Flow Science. The modeled temperature plumes show a zone of passage at the surface of the Sacramento River approximately 75-100 feet wide on the west bank and 175-200 feet wide on the east bank. The surface width of the river at the diffuser is 600 feet. The zone of passage at the bottom of the river is smaller due to the configuration of the west bank. The study concluded that both surface water swimming fish and bottom water swimming fish would avoid the heated plume by swimming around or on top of it.

According to the United States Fish and Wildlife Service, the range of delta smelt extends from San Pablo Bay upstream to about Verona on the Sacramento River, though the majority of the population occupies from western Suisun Bay to about the City of Sacramento. Delta smelt enter the Sacramento River and Deep Water Ship Channel year round and specifically from late December to June to spawn in temperatures between about 12-18°C. Pre-spawning adults could be expected in the vicinity of the City of Sacramento from the latter part of December through June. Some larvae could be expected in the vicinity of the City of Sacramento during February through June. During the larval stage delta smelt are at their most vulnerable to zones of poor water quality or high water temperature due to their small size and limited mobility.

The Critical Thermal Maxima (CTM) is the temperature for a given species above which most individuals respond with unorganized locomotion and is considered to be the lethal temperature, for juvenile and adult delta smelt it is reported as 25.4°C (77.7°F)[1]. Delta smelt egg survival decreases at temperatures above 15-16°C (about 60°F) and is greatly reduced by 20°C (68°F)[2] Other ways to affect aquatic organisms include the rate of temperature change and the organism's ability to avoid or move to more favorable temperatures.

Central Valley Water Board staff requested the National Marine Fisheries Service (NMFS), the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Game evaluate the July 2010 study and make recommendations on the thermal plan exception request by the Discharger.

The USFWS expressed several concerns about the lack of knowledge on the synergistic effects of multiple pollutants, like chemical and thermal contamination. The concern that potential of thermal discharges may create winter refugia for non-native predator species and uncertainty about the near-field thermal conditions and delta smelt's migration behavior.

The USFWS recommends the exception from WDR No. 5-00-188 be retained and no further exception be permitted for protection of Delta smelt. Additionally, the USFWS recommends the Discharger initiate planning to address future increases in the discharge with consideration for changes in the Sacramento River as a result of climate change without the need for sequential Thermal Plan exceptions. To determine whether permitted conditions are protective of delta smelt and Sacramento River biota, the USFWS requests specific monitoring and studies be conducted and include the following:

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1 Swanson, Christina, Turid Reid, Paciencia S. Young and Joseph J. Cech, Jr. 2000. Comparative environmental tolerances of threatened delta smelt (Hypomesus transpacificus) and introduced wakasagi (H. nipponensis) is an altered California estuary. Oecologia 123: 384-390.

2 Bennett, WA. 2005. Critical assessment of the delta smelt population in the San Francisco Estuary, California. San Francisco Estuary and Watershed Science 3.

(1) Continuous monitoring of the thermal discharge in coordination with mixing zone monitoring during December-June.

(2) Study using hydroacoustic technology to determine if there are aggregations of large fish or schools of small fish in the zone of elevated water temperature that are atypical compared to other nearby mid-channel river reaches.

(3) Acute and chronic testing with rainbow trout bi-weekly during December-June for two years with ambient water upstream of Freeport Bridge and 65 feet for acute and 360 feet for chronic downstream of the diffuser.

(c) WQBELs. The temperature effluent limitation is carried forward from the previous Order.

(d) Plant Performance and Attainability. The temperature effluent limitation is carried forward from the previous Order. The Discharger has demonstrated continuous compliance with the effluent limitation. Therefore, based on existing performance the Facility can immediately comply with the temperature effluent limit.

4. WQBEL Calculations

a. This Order includes WQBELs for copper, ammonia, cyanide, carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methylene chloride, tetrachloroethylene, pentachlorophenol, bis(2-ethylhexyl) phthalate, dibenxon(ah)anthracene, N-nitrosodimethylamine, aluminum, nitrate, nitrite, manganese, MTBE, mercury, temperature, settleable solids, diazinon, and chlorpyrifos. As discussed above in Section IV.C.2.d, the Discharger developed a dynamic mathematical model to evaluate near-field dilution and a mixing zone for compliance with chronic aquatic life criteria has been granted. The Discharger's dynamic model has been used to calculate the WQBELs for cyanide. For the remaining constituents a steady-state approach has been used to calculate the WQBELs. The general steady-state methodology for calculating WQBELs based on the different criteria/objectives is described in subsections IV.C.4.b through e, below. See Attachment H for the WQBEL calculations. The methodology for calculating WQBELs using the dynamic model is discussed in subsection IV.C.4.f, below.

b. Effluent Concentration Allowance. For each water quality criterion/objective, the ECA is calculated using the following steady-state mass balance equation from Section 1.4 of the SIP:

$ECA = C + D(C - B)$ *where* $C > B$, *and*
$ECA = C$ *where* $C \leq B$

<u>where:</u>
ECA = effluent concentration allowance

D = dilution credit
C = the priority pollutant criterion/objective
B = the ambient background concentration.

According to the SIP, the ambient background concentration (B) in the equation above shall be the observed maximum with the exception that an ECA calculated from a priority pollutant criterion/objective that is intended to protect human health from carcinogenic effects shall use the arithmetic mean concentration of the ambient background samples. For ECAs based on MCLs, which implement the Basin Plan's chemical constituents objective and are applied as annual averages, an arithmetic mean is also used for B due to the long-term basis of the criteria.

c. **Basin Plan Objectives and MCLs.** For WQBELs based on site-specific numeric Basin Plan objectives or MCLs, the effluent limitations are applied directly as the ECA as either an MDEL, AMEL, or average annual effluent limitations, depending on the averaging period of the objective.

d. **Aquatic Toxicity Criteria.** WQBELs based on acute and chronic aquatic toxicity criteria are calculated in accordance with Section 1.4 of the SIP. The ECAs are converted to equivalent long-term averages (i.e. LTA_{acute} and $LTA_{chronic}$) using statistical multipliers and the lowest LTA is used to calculate the AMEL and MDEL using additional statistical multipliers.

e. **Human Health Criteria.** WQBELs based on human health criteria, are also calculated in accordance with Section 1.4 of the SIP. The ECAs are set equal to the AMEL and a statistical multiplier was used to calculate the MDEL.

$$AMEL = mult_{AMEL}\left[\min\left(\overbrace{M_A ECA_{acute}}^{LTA_{acute}}, M_C ECA_{chronic}\right)\right]$$

$$MDEL = mult_{MDEL}\left[\min\left(M_A ECA_{acute}, \underbrace{M_C ECA_{chronic}}_{LTA_{chronic}}\right)\right]$$

$$MDEL_{HH} = \left(\frac{mult_{MDEL}}{mult_{AMEL}}\right) AMEL_{HH}$$

<u>where:</u>
multAMEL = statistical multiplier converting minimum LTA to AMEL
multMDEL = statistical multiplier converting minimum LTA to MDEL
MA = statistical multiplier converting acute ECA to LTA_{acute}
MC = statistical multiplier converting chronic ECA to $LTA_{chronic}$

f. **Dynamic Model.** Section 1.4.D. of the SIP allows the use of a dynamic model to calculate WQBELs. Chapter 5.4.1 of the TSD (see page 101) provides guidance for deriving WQBELs using a dynamic model. A three step process has been used in this Order to derive WQBELs using the Discharger's dynamic model[1].

(1) A point of compliance (edge of mixing zone) is selected. For acute aquatic life criteria the edge of the acute mixing zone is selected and for chronic aquatic life criteria the edge of the chronic mixing zone is selected.

(2) An LTA is developed for both acute and chronic criteria (i.e., LTA_{acute} and $LTA_{chronic}$) by iteratively running the dynamic model with successively lower [or higher] LTAs until the model shows compliance with the water quality criteria at the edge of the mixing zone at the appropriate frequency of compliance and averaging period (e.g., acute criteria are typically based on a 1-hour average exposure and chronic criteria are based on a 4-day exposure).

(3) The LTA and CV are used to derive MDELs and AMELs using the steady-state procedures described in Step 5 of Section 1.4 of the SIP. WQBELs are calculated using the LTA_{acute} and $LTA_{chronic}$ and the more stringent WQBELs are applied.

Summary of Final Effluent Limitations
Discharge Point No. EFF- 001

Table F-16. Summary of Final Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Conventional Pollutants						
Biochemical Oxygen Demand, 5-day @ 20°C	mg/L	10	15	20	--	--
	lbs/day[1]	15,100	22,700	30,200	--	--
	% Removal	85	--	--	--	--
Total Suspended Solids	mg/L	10	15	20	--	--
	lbs/day[1]	15,100	22,700	30,200	--	--
	% Removal	85	--	--	--	--
pH	standard units	--	--	--	6.0	8.5
Priority Pollutants						
Bis(2-ethylhexyl)phthalate	µg/L	--	--	13		
Carbon Tetrachloride	µg/L	--	--	5.3	--	--
Chlorodibromomethane	µg/L	--	--	2.2	--	--
Copper, Total Recoverable	µg/L	7.3	--	9.3	--	--
Cyanide	µg/L	--	--	11	--	--
Dibenzo(ah)anthracene	µg/L	0.2	--	0.4	--	--
Dichlorobromomethane	µg/L	--	--	3.4	--	--
Methylene Chloride	µg/L	4.7	--	11	--	--

1 These procedures are discussed in more detail in a Technical Memorandum from Larry Walker Associates to SRCSD titled, "Calculation of WQBEL via Output from a Dynamic Model – DRAFT", 23 February 2009.

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
N-nitrosodimethylamine	µg/L	0.00069	--	0.0014	--	--
Pentachlorophenol	µg/L	--	--	18	--	--
Tetrachloroethylene	µg/L	--	--	4.4	--	--
Non-Conventional Pollutants						
Settleable Solids	ml/L	0.1	--	0.2	--	--
Aluminum, Total Recoverable[2]	µg/L	503	--	750	--	--
Ammonia Nitrogen, Total (as N)	mg/L	1.8	--	2.2	--	--
	lbs/day[1]	2720	--	3320	--	--
Nitrate, Total (as N)	mg/L	10	--	--	--	--
Manganese, Total Recoverable	µg/L	--	--	85	--	--
Methyl Tertiary Butyl Ether	µg/L	--	--	18	--	--
Electrical Conductivity	µmhos/cm	900[9]				
Total Coliform Organisms[3]	MPN/100mL	--	--	--	--	240
Total Residual Chlorine[4]	mg/L	--	--	--	--	--
Acute Toxicity[5]	--	--	--	--	--	--
Chronic Toxicity[6]	--	--	--	--	--	--
Temperature[7]	°F	--	--	--	--	--
Average Dry Weather Flow[8]	mgd	--	--	--	--	--

1. Based on a design average dry weather flow of 181 MGD.
2. Shall not exceed 200 µg/L as an annual average.
3. Effluent total coliform organisms also shall not exceed i.) 2.2 MPN/100ml, as a 7-day median; and ii). 23 MPN/100ml, more than once in any 30-day period.
4. Effluent total residual chlorine shall not exceed i) 0.011 mg/L as a 4-day average; and ii) 0.019 mg/L as a 1-hour average.
5. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than 70%, minimum for any one bioassay and no less than 90%, median for any three consecutive bioassays.
6. There shall be no chronic toxicity in the effluent discharge.
7. The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than 20°F from 1 May through 30 September and more than 25°F from 1 October through 30 April.
8. The average dry weather discharge flow shall not exceed 181 mgd.
9. Annual average effluent limit

5. Whole Effluent Toxicity (WET)

For compliance with the Basin Plan's narrative toxicity objective, this Order requires the Discharger to conduct whole effluent toxicity testing for acute and chronic toxicity, as specified in the Monitoring and Reporting Program (Attachment E section V.). This Order also contains numeric effluent limitations for acute toxicity, a narrative effluent limitation for chronic toxicity, and requires the Discharger to implement best management practices to investigate the causes of, and identify corrective actions to reduce or eliminate effluent toxicity.

a. **Acute Aquatic Toxicity.** The Basin Plan contains a narrative toxicity objective that states, "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at page III-8.01). The Basin Plan also states that, "*...effluent limits based upon acute biotoxicity tests of effluents will be prescribed where appropriate...*". USEPA Region 9 provided guidance for the development of acute toxicity effluent limitations in the absence of numeric water quality objectives for toxicity in its document titled "Guidance for NPDES Permit Issuance", dated February 1994. In section B.2. "Toxicity Requirements" (pgs. 14-15) it states that, "*In the absence of specific numeric water quality objectives for acute and chronic toxicity, the narrative criterion 'no toxics in toxic amounts' applies. Achievement of the narrative criterion, as applied herein, means that ambient waters shall not demonstrate for acute toxicity: 1) less than 90% survival, 50% of the time, based on the monthly median, or 2) less than 70% survival, 10% of the time, based on any monthly median. For chronic toxicity, ambient waters shall not demonstrate a test result of greater than 1 TUc.*" Accordingly, effluent limitations for acute toxicity have been included in this Order as follows:

Acute Toxicity. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

Minimum for any one bioassay-- ----------------------------------	70%
Median for any three consecutive bioassays -------------------	90%

The previous permit required the acute bioassays be performed using 100% effluent and using fathead minnows (*Pimephales promelas*) as the test species. This order continues to require the acute bioassays be performed using 100% effluent and changes the test species to rainbow trout (*Oncorhynchus mykiss*) due to the presence of salmonids in the receiving water. The Discharger will need six months to modify its system to use rainbow trout and obtain ELAP certification. Therefore, this Order includes an effective date of 1 July 2011 to begin using rainbow trout. In the interim, this Order allows the testing be performed using fathead minnows.

b. **Chronic Aquatic Toxicity.** The Basin Plan contains a narrative toxicity objective that states, "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at page III-8.00. Since the Facility is a publicly-owned treatment works that is categorized as a major facility, the influent can be highly variable due to commercial, industrial, and other inputs. Therefore, it is assumed that the discharge has chronic whole effluent toxicity (WET) levels that have a reasonable potential to cause or contribute to an in-stream excursion above of the Basin Plan's narrative toxicity objective. This Order includes a narrative effluent limitation for chronic toxicity, chronic WET monitoring requirements, and a provision that requires the Discharger to investigate the causes of, and identify and implement corrective actions to reduce or eliminate effluent toxicity.

The Monitoring and Reporting Program of this Order requires quarterly chronic WET monitoring for demonstration of compliance with the narrative toxicity objective. In addition to WET monitoring, the Special Provision in section VI.C.2.a. of the Order requires the Discharger to submit to the Central Valley Water Board an updated TRE Workplan for approval by the Executive Officer. The provision also includes a numeric toxicity monitoring trigger, requirements for accelerated monitoring, and requirements for TRE initiation if toxicity is demonstrated.

D. Final Effluent Limitations

1. Mass-based Effluent Limitations

40 CFR 122.45(f)(1) requires effluent limitations be expressed in terms of mass, with some exceptions, and 40 CFR 122.45(f)(2) allows pollutants that are limited in terms of mass to additionally be limited in terms of other units of measurement. This Order includes effluent limitations expressed in terms of mass and concentration. In addition, pursuant to the exceptions to mass limitations provided in 40 CFR 122.45(f)(1), some effluent limitations are not expressed in terms of mass, such as pH and temperature, and when the applicable standards are expressed in terms of concentration (e.g., CTR criteria and MCLs) and mass limitations are not necessary to protect the beneficial uses of the receiving water.

Mass-based effluent limitations were calculated based upon the design flow (Average Dry Weather Flow) permitted in section IV.A.1.h. of this Order.

2. Averaging Periods for Effluent Limitations

40 CFR 122.45 (d) requires average weekly and average monthly discharge limitations for publicly owned treatment works (POTWs) unless impracticable. However, for toxic pollutants and pollutant parameters in water quality permitting, USEPA recommends the use of a maximum daily effluent limitation in lieu of average weekly effluent limitations for 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.*" (TSD, pg. 96) This Order utilizes maximum daily effluent limitations in lieu of average weekly effluent limitations for aluminum, ammonia, manganese, MTBE, bis(2-ethylhexyl)phthalate, carbon tetrachloride, chlorpyrifos, diazinon, copper, cyanide, chlorodibromomethane, dichlorobromomethane, dibenzon(a,h)anthracene, methylene chloride, N-nitrosodimethylamine, pentachlorophenol and tetrachloroethylene as recommended by the TSD for the achievement of water quality standards and for the protection of the beneficial uses of the receiving stream. Furthermore, for BOD_5, TSS, pH,

chlorine residual, and total coliform organisms, weekly average effluent limitations have been replaced or supplemented with effluent limitations utilizing shorter averaging periods. The rationale for using shorter averaging periods for these constituents is discussed in section IV.C.3. of this Fact Sheet.

For effluent limitations based on Secondary MCLs, this Order includes annual average effluent limitations. The Secondary MCLs are drinking water standards contained in Title 22 of the California Code of Regulations. Title 22 requires compliance with these standards on an annual average basis, when sampling at least quarterly. Since it is necessary to determine compliance on an annual average basis, it is impracticable to calculate average weekly and average monthly effluent limitations.

3. Satisfaction of Anti-Backsliding Requirements

The effluent limitations in this Order are at least as stringent as the effluent limitations in the existing Order, with the exception of effluent limitations for chloroform, lindane, silver, lead, zinc and cyanide. The effluent limitations for these pollutants are less stringent than those in Order No. 5-00-188. This relaxation of effluent limitations is consistent with the anti-backsliding requirements of the CWA and federal regulations.

Order No. 5-00-188 included effluent limitations for chloroform, lindane, silver, lead, zinc and cyanide. Based on monitoring data collected from June 2005 – July 2008, the discharge does not indicate reasonable potential to exceed water quality objectives for chloroform, lindane, silver, lead and zinc. Therefore, effluent limitations for these parameters were not included in this Order. The lack of effluent limitations in this Order does not constitute backsliding.

Order No. 5-00-188 established effluent limitations for cyanide of 10.8 µg/L as a daily average with a trigger of 6.1 µg/L. The cyanide limitation of 10.8 µg/L was based on the MEC of 9.0 µg/L times a safety factor of 1.2 (which was proposed by the Discharger and accepted by the Central Valley Water Board). A trigger concentration exceedance results in an investigation and Central Valley Water Board notification with the Central Valley Water Board may require an action plan to address the cause of the exceedance. The Central Valley Water Board found that the trigger concentration would be protective and appropriate if established as the 95th percentile value assuming that historical data follows a lognormal probability distribution which was 6.1 mg/L. The Discharger performed a dynamic model for cyanide which resulted in a chronic LTA of 13.9 mg/L. The calculated limit is 11.0 mg/L as an AMEL with a MDEL of 22.0 mg/L. As discussed in Section IV.C.2.d, the dynamic model represents a more accurate picture of the mixing zone concentrations. This Order relaxes the effluent limitation for cyanide from Order No. 5-00-188. The dynamic model data submitted by the Discharger is considered new information by the Central Valley Water Board.

Order No. 5-00-188 established effluent limitations for oil and grease. As discussed further in section IV.C.3, monitoring data over the term of Order No. 5-00-188 indicated that the discharge no longer exhibits reasonable potential to exceed water quality objectives for oil and grease. Therefore, the effluent limitation is not retained in this Order.. The monitoring data submitted by the Discharger is considered new information by the Central Valley Water Board.

The revision of the cyanide limitation and the removal of effluent limitations for oil and grease, chloroform, lindane, silver, lead and zinc are consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16. Any impact on existing water quality will be insignificant.

4. Satisfaction of Antidegradation Policy

This Order does not allow for an increase in flow or mass of pollutants to the receiving water with the exception of cyanide as discussed in section D.3 of the Fact Sheet. Antidegradation analyses were completed prior to adoption of the existing NPDES permits that grants a discharge capacity of 181 mgd. However, conditions in the Sacramento River and Delta downstream of the discharge have significantly changed since prior antidegradation analyses were conducted, so it is required that a a new antidegradation analysis be conducted for the existing discharge.

A complete antidegradation analysis "Antidegradation Analysis for Proposed Wastewater Treatment Plant discharge Modification" was submitted by the Discharger with the Report of Waste Discharge in February 2005. The Discharger's antidegradation analysis was based on the incremental increase of the SRWTP capacity expansion from 181 mgd to 218 mgd. This antidegradation analysis was updated and revised based on the Central Valley Water Board staff's comments and more recent water quality data in the Discharger's "Antidegradation Analysis for Proposed Discharge Modification for the Sacramento Regional Wastewater Treatment Plant" dated 20 May 2009. Along with the 37 mgd increase in capacity, the antidegradation analysis also modeled the worst-case concentrations at the discharge of 181 mgd and for 154 mgd (baseline data for the EIR).

The Discharger's Antidegradation Analysis (ADA) identified the constituents of concern and categorized them as Category 1, Category 2, and Category 3 pollutants (see Table F-18). Category 1 pollutants are of concern regionally and have potential impacts on the Delta ecosystem and its water quality. Category 2 pollutants are constituents that may cause localized impacts, but negligible impacts in far-field receiving waters. Category 3 pollutants are constituents that were detected in the discharge, but have no history of contributing adverse impacts in the Sacramento River.

The Discharger evaluated background river concentrations and effluent concentrations and determined which constituents were of concern for impacting beneficial uses or of concern by stakeholders. Those constituents were placed into three categories. The first category includes constituents that are of regional concern and could impact the beneficial uses both locally (near field) and in farther reaches of the Delta (far field). Those constituents are: ammonia, total nitrogen, nitrate plus nitrite, total Kjeldahl nitrogen (TKN), total phosphorus, electrical conductivity (EC), total dissolved solids (TDS), chloride, total organic carbon, mercury, and dissolved oxygen.

The second category includes constituents that may impact within 700 feet downstream of the diffuser or the near field. These constituents include: aluminum, cadmium, copper, zinc, total coliform organisms and temperature.

The third category includes constituents of concern that generally had no history of impacts to the Sacramento River. The constituents evaluated in the ADA are shown in Table F-18, below.

The Near Field and Far Field models previously described were used to determine reasonable worst-case impacts on the receiving waters. In the ADA, the focus was on the incremental increase from an average dry weather discharge flow of 181 mgd to 218 mgd. However, due to a legal challenge of the Discharger's EIR and due to an overall slow down in the economy and growth in the Sacramento area, the Discharger withdrew its request for an expansion of discharge flow. Therefore, the information provided in the ADA was used by Central Valley Water Board staff to evaluate the impacts of the discharge at the permitted discharge flow of 181 mgd. For each pollutant the amount of reduced assimilative capacity was calculated to determine whether the increased pollutant loading was significant. Table F-18, below, summarizes the antidegradation impacts for the constituents of concern. The constituents with the largest impacts include ammonia, salinity (e.g., electrical conductivity, total dissolved solids, and chloride), copper, cyanide, bis(2-ethylhexyl)phthalate, bromodichloromethane, chloroform, and chlorpyrifos.

As shown in Table F-18, the existing permitted discharge is degrading the receiving water. Therefore, the Discharger must use best practicable treatment or control (BPTC) of the discharge in accordance with State Water Board Resolution 68-16. The Sacramento River and Sacramento-San Joaquin Delta are high quality waters of exceptional recreation, economical, and ecological significance to the people of the State of California. As discussed below, the Central Valley Water Board finds that in order to maintain and enhance the water quality of the Sacramento River and Sacramento-San Joaquin Delta, the Discharger must implement BPTC. For the following reasons, BPTC for this facility includes implementation of nitrification, denitrification, and the equivalent of Title 22 filtration with ultraviolet light, ozone or chlorine disinfection treatment.

- The Sacramento River and Sacramento-San Joaquin Delta at the vicinity of the outfall are home to at least nine state and federally protected threatened or endangered species[1].

[1] Comment letter from USFWS to Kathy Harder dated 15 June 2010.

- The Sacramento River and Sacramento-San Joaquin Delta support a trillion dollar economy with $27 billion economy for agriculture.[1]

- The Sacramento River and Sacramento-San Joaquin Delta provide drinking water to 25 million people of the State.[2]

- The Sacramento River and Sacramento-San Joaquin Delta support 12 million recreational user days per year, including 290 shoreline recreational areas, 300 marinas and half a million boaters.[3]

- Ammonia, along with BOD, from the SRWTP reduces the dissolved oxygen in the Sacramento River and Sacramento-San Joaquin Delta for nearly 40 miles below its discharge[4]. The oxygen depleting constituents from the SRWTP use or will use all the assimilative capacity of the River and Delta leaving no assimilative capacity available to other communities that currently reduce oxygen demanding constituents by implementing advanced treatment processes.

- The ammonia from the SRWTP contributes to the water quality problems in the Suisun Bay[5].

- The ammonia from the SRWTP is acutely and chronically toxic to species, including copepods[6] and freshwater mussels that reside in the Sacramento River and Sacramento-San Joaquin Delta.

- Ammonia in the SRWTP effluent combined with chlorine disinfection creates nitrosoamines at levels 100 times greater than the primary MCL. Nitrosoamines are highly mutagenic and potentially carcinogenic.

- At times the risk of illness or infection from pathogenic protozoans nearly quadruples between upstream and downstream of the SRWTP discharge[7].

- Filtration of disinfected SRWTP effluent will result in reduction of total organic carbon, copper, mercury, phosphorus, TSS, BOD_5 and possibly Constituents of Emerging Concern (CECs)[8].

- Reduction or elimination of ammonia, nitrate and protozoans will reduce impacts to the beneficial uses of the Sacramento River and Sacramento-San Joaquin Delta from the SRWTP discharge.

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[1] http://www.delta.ca.gov/res/docs/Sacto-SanJoaqin_fact.pdf
[2] Id.
[3] Id.
[4] Memorandum from Mitchell J. Mysliwiec (LWA) to Bob Seyfried, SRCSD "Response to Tetra Tech Comments on the LDOPA", 26 August 2010.
[5] Letter from Bruce Wolfe, SFRWQCB to Kathy Harder, dated 4 June 2010.
[6] Swee Teh, Presentation at Contaminants Workshop, July 6, 2010
[7] Gerba, Charles P., "Estimated Risk of Illness from Swimming in the Sacramento River", 23 February 2010.
[8] Technical Memorandum: Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant, LWA, May 2010.

- o Other existing wastewater treatment plants that discharge directly or indirectly to the Sacramento River and Sacramento-San Joaquin Delta are or will be implementing advanced treatment processes to reduce or eliminate ammonia, nitrate and pathogens.

- o The costs per capita to implement advanced treatment processes at other POTWs are similar to the projected costs per capita for advanced treatment at the SRWTP. Project costs can vary greatly depending on how much existing treatment facilities can be incorporated into the advanced treatment process. In some cases, the cost is for a new treatment facility, differing treatment processes and/or the costs are based on construction completed several years ago.

Table F-17. Per Capita Costs for Tertiary Upgrades[1]

Discharger	Population (July 2008) www.city-data.com	Upgrade and Expansion Costs	Approximate per capita cost ($)
Ironhouse Sanitary District	30,000	$54,500,000	$1,800
City of Roseville – Dry Creek WWTP	56,330	$95,000,000	$1,700
City of Roseville – Pleasant Grove WWTP	56,330	$120,000,000	$2,100
City of Manteca	65,028	$22,800,000	$350
City of Lodi	61,301	$60,000,000	$1000
City of Woodland	54,567	$17,000,000	$300
City of Tracy	79,196	$40,000,000	$500
City of Vacaville	92,219	$150,000,000	$1,600
Sacramento Regional County Sanitation District	1,300,000	$2,066,000,000	$1,600

This Order requires compliance with applicable federal technology-based standards and with WQBELs where the discharge could have the reasonable potential to cause or contribute to an exceedance of water quality standards.

Various alternative measures, including those alternatives provided as part of the proposed waste discharge requirements, have been considered. After considering the alternatives, these waste discharge requirements which implement Title 22 (or equivalent) tertiary filtration, nitrification and denitrification will result in the best practicable treatment or control of the discharge necessary to assure that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.

[1] Telephone Survey by Elizabeth Lee, CVWQCB

Economic and socioeconomic studies provided by the Sacramento Regional County Sanitation District, various water agencies, the North State Building Industry Association, and the University of Pacific have been considered. The purported costs vary widely depending on the study with the Sacramento Regional County Sanitation District's proposed costs of upgrades to be approximately $2 billion as the highest purported cost. Even if the approximately $2 billion costs projected by the Sacramento Regional County Sanitation District are correct, the increased sewage treatment rate of $60 per month is reasonable because (1) many communities discharging to surface waters pay substantially more for sewer service; and (2) the increased sewage treatment rate of $60 per month may be overestimated given that other large communities in the Sacramento/Delta area that have already upgraded their treatment facilities to advanced treatment also similar to that proposed in these waste discharge requirements have sewer fees substantially less than the monthly fees projected by the Sacramento Regional County Sanitation District, including the Cities of Stockton, Roseville, Tracy, and Lodi.

The action to adopt these waste discharge requirements is justified by socioeconomic considerations because (1) all large wastewater treatment plants in the Delta (namely, the Cities of Lodi, Manteca, Stockton, and Tracy) already provide tertiary filtration treatment; (2) the effluent discharged by the Cities of Lodi, Manteca, Stockton, and Tracy is much cleaner than the SRCSD effluent by significantly reducing the pathogens discharged to Delta waters, reducing the oxygen demand on Delta waters, reducing the loading of heavy metals and mercury to the Delta; and reducing aquatic toxicity caused by ammonia, (3) the Cities of Lodi, Manteca, Stockton, and Tracy have constructed and are operating similar advanced treatment systems and have not suffered significant adverse economic impacts as a result of these upgrades, and (4) the Sacramento Regional County Sanitation District's failure to implement tertiary filtration, nitrification, and denitrification may result or will likely result in an adverse impact to the REC-1, municipal and domestic water supply, aquatic life, and agricultural beneficial uses. Consequently, these waste discharge requirements will result in the best practicable treatment or control of the discharge necessary to assure that pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.

The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge.

Table F-18. Antidegradation Analysis

Constituent	Units	Mean Effluent Conc.[1]	Mean R-1 Conc.[1]	Median 181 mgd Conc @ Hood[2]	Mean 181 mgd Conc @ 700 ft[2]	Applicable Water Quality Objective	Percent Assimilative Capacity Used
Category 1 Pollutants							
Ammonia (summer)	mg/L	24	0.1	0.25	0.64	1.55-6.7	2.3%-10.3%
Ammonia (winter)	mg/L	24	0.1	0.31	0.85	1.55-6.7	3.2%-14.5%
Total Nitrogen (summer)	mg/L	24	0.39	0.64	0.94	--	--
Total Nitrogen (winter)	mg/L	24	0.39	0.7	1.15	--	--
Nitrate plus nitrite	mg/L	0.13	0.16	0.12	0.16	10	0.0%
TKN	mg/L	26	0.35	0.57	0.95	--	--
Total Phosphorus	mg/L	2.34	0.11	0.08	0.18	--	--
EC	µmhos/cm	764	163	157	182	700	3.5%
TDS	mg/L	410	98	--	108	450	2.8%
Chloride	mg/L	91	5.1	5.7	7.81	106	2.7%
TOC	mg/L	17.5	2.34	2.3	2.82	--	--
Mercury	ng/L	4.1	5.6		5.54	--	--
Category 2 Pollutants							
Aluminum	µg/L	23.3	969	--	327.3	200	--
Cadmium	µg/L	0.023	0.0081	--	0.009	1.5	0.1%
Copper	µg/L	4.31	1.47	--	1.56	5.62	2.2%
Zinc	µg/L	21.2	0.57	--	1.22	74.5	0.9%
Temperature		23	15.5	--	--	--	--
Total Coliform		7.8	1983	--	--	--	--
Category 3 Pollutants							
Antimony	µg/L	0.32	0.066	--	0.074	6	0.1%
Arsenic	µg/L	1.64	1.35	--	1.36	10	0.1%
Chromium	µg/L	0.69	0.15	--	0.176	--	--
Lead	µg/L	0.25	0.03	--	0.037	1.38	0.5%
Molybdenum	µg/L	2.83	0.51	--	0.584	10	0.8%
Nickel	µg/L	2.37	0.67	--	0.72	32.8	0.2%
Selenium	µg/L	0.79	0.21	--	0.23	5	0.4%
Silver	µg/L	0.063	0.014	--	0.016	1.35	0.1%
BOD	mg/L	7.59	<2.13	--	--	--	--
Manganese	µg/L	64.2	3.7	--	---	50	
Cyanide	µg/L	5.12	3.92	--	3.95	5.2	2.3%
TSS	mg/L	6.68	29.4	--	28.6	--	--
1,4-Dichlorobenzene	µg/L	0.68	<0.27	--	0.28	5	0.2%
Bis(2-ethylhexyl)phthalate	µg/L	2.6	0.11	--	0.19	1.8	4.7%
Bromodichloromethane	µg/L	0.95	<0.37	--	0.39	0.56	10.5%
Chloroethane	µg/L	0.28	<0.42	--	0.42	75	0.0%
Chloroform	µg/L	15	0.93	--	1.38	80	0.6%
Diethyl Phthalate	µg/L	1.46	0.047	--	0.095	23000	0.0%
Di-n-butyl Phthalate	µg/L	1.35	0.072	--	0.21	2700	0.0%
Methyl Chloride	µg/L	0.73	0.47	--	0.48	3	0.4%

Constituent	Units	Mean Effluent Conc.[1]	Mean R-1 Conc.[1]	Median 181 mgd Conc @ Hood[2]	Mean 181 mgd Conc @ 700 ft[2]	Applicable Water Quality Objective	Percent Assimilative Capacity Used
Methylene Chloride	µg/L	1	<0.69	--	0.7	4.7	0.2%
Tetrachloroethylene	µg/L	0.13	0.38	--	0.37	0.8	--
Toluene	µg/L	0.25	0.36	--	0.36	150	0.0%
Chlorpyrifos	µg/L	0.015	0.006	--	0.01	0.015	44.4%
Dibromochloromethane	µg/L	0.14	<0.42	--	--	0.41	--
n-Nitrosodimethylamine	µg/L	0.72	<2.69	--	--	0.00069	--

1 Table 5-2, "Antidegradation Analysis for Proposed Discharge Modification for the Sacramento Regional Wastewater Treatment Plant" 20 May 2009

2 Chapter 5, ibid. The constituent concentrations at Hood are representative of the completely mixed conditions, whereas, the constituent concentrations at 700 feet downstream of the outfall is representative of the average concentration of the plume.

5. Stringency of Requirements for Individual Pollutants

This Order contains both technology-based effluent limitations and WQBELs for individual pollutants. The technology-based effluent limitations consist of restrictions on flow and percent removal requirements for BOD_5 and TSS. The WQBELs consist of restrictions on ammonia, copper, cyanide, chlorpyrifos, diazinon, aluminum, carbon tetrachloride, dichlorobromomethane, chlorodibromomethane, bis(2-ethlyhexyl) phthalate, methylene chloride, tetrachlorethylene, pentachlorophenol, dibenzo(ah)anthracene, N-nitrosodimethylamine, manganese, methyl-tertairy-butyl-ether, nitrite, nitrate, chlorine residual, settleable solids, mercury and electrical conductivity. This Order's technology-based pollutant restrictions implement the minimum, applicable federal technology-based requirements. In addition, this Order includes new effluent limitations for BOD5, total coliform and TSS to meet numeric objectives or protect beneficial uses. The rationale for including these limitations is explained in the Fact Sheet. In addition, the Regional Water Board has considered the factors in CWC section 13241 in establishing these requirements.

WQBELs have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual WQBELs for priority pollutants are based on the CTR-SIP, which was approved by USEPA on 18 May 2000. All beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to 30 May 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to 30 May 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the CWA.

This Order contains pollutant restrictions that are more stringent than applicable federal requirements and standards. Specifically, this Order includes effluent limitations for BOD_5 and TSS that are more stringent than applicable federal standards, but that are nonetheless necessary to meet numeric objectives or protect beneficial uses. The rationale for including these limitations is explained in section IV.C.3 of this Fact Sheet.

6. Performance-based Effluent Limitations.

Performance-based effluent limitations have been used in this Order to establish interim effluent limitations and final effluent limitations where the calculated WQBEL (w/dilution credit) results in effluent limitations that exceed facility performance. Table F-20, below, displays the information used in developing the performance-based effluent limitations and the procedures for calculating performance-based effluent limitations are discussed below.

In developing the performance-based effluent limitation, where there are 10 sampling data points or more, sampling and laboratory variability is accounted for by establishing interim limits that are based on normally distributed data where 99.9% of the data points will lie within 3.3 standard deviations of the mean (Basic Statistical Methods for Engineers and Scientists, Kennedy and Neville, Harper and Row). Therefore, the interim limitations in this Order are established as the mean plus 3.3 standard deviations of the available data. However, if the maximum effluent concentration (MEC) exceeds the mean plus 3.3 standard deviation, then the MEC is the used for the interim limitation. When there are less than 10 sampling data points available, the EPA *Technical Support Document for Water Quality-based Toxics Control* ((EPA/505/2-90-001), TSD) recommends a coefficient of variation of 0.6 be utilized as representative of wastewater effluent sampling. The TSD recognizes that a minimum of 10 data points is necessary to conduct a valid statistical analysis. The multipliers contained in Table 5-2 of the TSD are used to determine a maximum daily limitation based on a long-term average objective. In this case, the long-term average objective is to maintain, at a minimum, the current plant performance level. Therefore, when there are less than 10 sampling points for a constituent, interim limitations are based on 3.11 times the maximum observed effluent concentration to obtain the daily maximum interim limitation (TSD, Table 5 2).

Where a dataset includes data reported below the laboratory detection limits (non-detects) the statistics, described above, becomes uncertain. In these situations, the regression on order statistics (ROS) technique was used to develop summary statistics and probability distribution functions. The ROS method was chosen because numerous studies have found that substituting one-half the reporting limit "results in substantial bias unless the proportion of missing data is small, 10 percent or less"[1]. This technique is often used with water quality data and is a useful tool

[1] Dennis R. Helsel, "More Than Obvious: Better Methods for Interpreting Nondetect Data," *Environmental Science and Technology* (15 October 2005): 419A

for evaluating data sets with at least 40% detected data[1]. Furthermore, the ROS method was chosen because imputation methods, such as ROS, depend less on assumptions of distributional shape than the maximum likelihood estimation (MLE) method[2]. The ROS technique develops probability plotting positions for each detected and non-detect data point based on the ordering of all data. A least squares line is fit by regressing the log transformed concentrations to the detected probability plotting positions. Fill-in concentrations are assigned to the non-detect data points for calculation of summary statistics based on the detected data probability plotting positions and the ordered statistics regression line equation. The summary statistics are calculated from the detected data points and the fill-in values for non-detect data. An estimated mean and standard deviation are used to calculate the 99.9th percentile performance-based effluent limitation, as described above.

Table F-19. Performance-based Effluent Limitations Statistics

Parameter	Units	MEC	# of Samples	% Detected	Mean	Std. Dev.	Performance-based Effluent Limitation
Ammonia[1,2]	mg/L	45	513	100	24.2	3.70	45
Copper	µg/L	6.34	114	100	4.16	0.803	6.8
Cyanide[3]	µg/L	10	176	58.5	4.85	1.89	11.1
Aluminum[3]	µg/L	35.2	61	93.4	17.6	5.39	35.4
Carbon Tetrachloride[4]	µg/L	1.7	101	5.9	--	--	5.3
Dibromochloromethane[4]	µg/L	0.7	101	16.8	--	--	2.2
Bromodichloromethane	µg/L	3.4	101	91.1	1.10	0.583	3.4
Bis(2-ethylhexyl) phthalate[5]	µg/L	8.1	115	99.1	0.854	0.506	12.5
Methylene Chloride[1,3]	µg/L	5.4	101	91.1	1.18	0.901	5.4
Tetrachloroethylene[4]	µg/L	1.4	101	13.9	--	--	4.4
Pentachlorophenol[4]	µg/L	5.7	115	0.9	--	--	17.7
Dibenzo(ah)antharacene[4]	µg/L	0.51	145	0.7	--	--	1.6
n-Nitrosodimethylamine[4]	µg/L	0.082	125	16.8	--	--	0.26
Manganese[5,6]	µg/L	82	34	100	4.16	0.0869	85.3
Methyl Tertiary Butyl Ether[4] (MTBE)	µg/L	5.8	128	2.3	--	--	18.0

Note: Data set are based on data collected between 12 June 2005 and 10 October 2009 unless noted.
1 Performance-based effluent limitation set to MEC.
2 Data set ranges from 15 June 2005 to 28 April 2010.
3 Regression on order statistics (ROS) method used.
4 Performance-based effluent limit estimated as 3.11 times the MEC because the amount of detected data is less than 20%
5 Mean and standard deviation are expressed as natural logarithms because the log-normal distribution is the best fit for the dataset.
6 Data set ranges from 19 April 2009 to 4 June 2009.

[1] Robert H. Shumway, Rahman S. Azari, and Masoud Kayhanian, "Statistical Approaches to Estimating Mean Water Quality Concentrations with Detection Limits," *Environmental Science and Technology* 36, no. 15 (2002): 3345-3353.
[2] Dennis R. Helsel, "More Than Obvious: Better Methods for Interpreting Nondetect Data," *Environmental Science and Technology* (15 October 2005): 420A

[7] Data set ranges from 11 June 2005 to 8 October 2008.
[8] Data set ranges from 5 June 2005 to 6 October 2009.

E. Interim Effluent Limitations

1. **Compliance Schedules for ammonia and Title 22 (or Equivalent) Requirements.** The permit limitations for ammonia, BOD_5, TSS, and total coliform organisms are more stringent than the limitations previously imposed. These new limitations are based on effluent sampling and the California Department of Public Health's recommendations.

   The establishment of Title 22 (or equivalent) and ammonia requirements has not been previously required for this discharge. This Order requires the Discharger to meet Title 22 (or equivalent) and ammonia requirements for all flows, which represents a newly interpreted water quality objective that results in a permit limitation more stringent than the limitation previously imposed.

   The Discharger has complied with the application requirements in paragraph 4 of the State Water Board's Compliance Schedule Policy, and the Discharger's application demonstrates the need for additional time to implement actions to comply with the new limitations, as described below. Based on the sample results for the effluent, it appears that the Discharger may be in immediate non-compliance with effluent limitations for ammonia, BOD_5, TSS, and total coliform organisms upon issuance of the permit. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. The Basin Plan for the Sacramento and San Joaquin River Basins includes a provision that authorizes the use of compliance schedules in NPDES permits for water quality objectives adopted after 25 September 1995 (see Basin Plan at page IV-16). The WQBELs for ammonia, BOD_5, TSS, and total coliform organisms are based on a new interpretation of the narrative standard for protection of receiving water beneficial uses. Therefore, a compliance schedule for compliance with the effluent limitations for ammonia, BOD_5, TSS, and total coliform organisms is established in the Order.

   a. **Demonstration that the Discharger needs time to implement actions to comply with a more stringent permit limitation specified to implement a new, revised, or newly interpreted water quality objective or criterion in a water quality standard.** Table 2.2 of the Infeasibility Report identifies constituents with the potential to exceed effluent limitations in the proposed NPDES Permit based on monitoring data collected between June 2005 and July 2008, including ammonia, chlorpyrifos, BOD_5, total coliform organisms, and TSS. The Discharger states that the requested compliance schedules are driven primarily by the need to construct treatment plant upgrades.

   b. **Diligent efforts have been made to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream, and the results of those efforts.** The Infeasibility Report states that the Discharger has pretreatment program that regulates industrial discharges and an active source control program. The discharger issues permits to significant and non-significant users which require monitoring of pollutants of concern and implementation of limits where deemed necessary to control a point source. Table 2-3 of the Infeasibility Report identifies 33 categorical industrial users, 27 significant industrial users and 306 non-significant users. Potential sources of ammonia, chlorpyrifos, BOD_5, TSS and total coliform organisms include domestic and non-domestic sources.

c. **Source control efforts are currently underway or completed, including compliance with any pollution prevention programs that have been established.** The Discharger has active source reduction programs targeting mercury, pesticides (including chlorpyrifos, diazinon and lindane) and waste medications.

d. **A proposed schedule for additional source control measures or waste treatment.** Table 2-4 of the Infeasibility Report provided a proposed compliance schedules, which includes source control for chlorpyrifos with achieving compliance with final effluent limits 6 years after the permit effective date. For ammonia pilot testing, design of improvements and construction to be achieved 10 years from the permit effective date and full compliance with effluent limitations by 1 December 2020. For BOD_5, TSS, and total coliform organisms, pilot testing, design and construction to be achieved 9 years from the permit effective date and full compliance with effluent limitations by 1 December 2019.

e. **Data demonstrating current treatment facility performance to compare against existing permit effluent limits, as necessary to determine which is the more stringent interim permit effluent limit to apply if a schedule of compliance is granted.** Interim effluent limitations must be based on current treatment plant performance or existing permit limitations, whichever is more stringent. The Discharger can consistently comply with the effluent limitations for BOD_5, total coliform organisms, and TSS required by Order No. 5-00-188. Therefore, the proposed NPDES Permit requires compliance with interim effluent limitations based on the effluent limitations required by Order No. 5-00-188. There are no existing permit effluent limitations for ammonia, so the interim limits have been calculated based on facility performance (see Table F-20).

f. **The highest discharge quality that can reasonably be achieved until final compliance is attained.** Compliance with the interim effluent limitations will ensure that the Discharger maintains the discharge at levels that can reasonably be achieved until final compliance is attained.

g. **The proposed compliance schedule is as short as possible**, given the type of facilities being constructed or programs being implemented, and industry experience with the time typically required to construct similar facilities or implement similar programs. The Discharger determined in the Infeasibility Report that the compliance schedule is as short as possible. The estimated durations for each task and estimated completion dates were included in Table 2-4 of the Infeasibility Report. Interim performance-based MDELs have been established in this Order. The interim limitations were determined as described in section IV.A.2. above, and are in effect through 1 December 2020 until the final limitations take effect. As part of the compliance schedule, this Order requires the Discharger to submit a corrective action plan and implementation schedule to assure compliance with the final effluent limitations for ammonia, BOD_5, TSS, and total coliform organisms. In addition, the Discharger shall update prepare and implement the existing a pollution prevention plan that is in compliance with CWC section 13263.3(d)(3). The interim numeric effluent limitations and source control measures will result in the highest discharge quality that can reasonably be achieved until final compliance is attained.

2. **Interim Limitations for Ammonia and Title 22 (or Equivalent) Requirements.** The SIP, section 2.2.1, The Compliance Schedule Policy requires that if a compliance schedule is granted for a CTR or NTR constituent, the Central Valley Water Board shall establish interim requirements and dates for their achievement in the NPDES permit. Interim numeric effluent limitations are required for compliance schedules longer than 1 year. The interim effluent limitations must be based on current treatment plant performance or existing permit limitations, whichever is more stringent. The State Water Board has held that the SIP may be used as guidance for non-CTR constituents. Therefore, the SIP requirement for interim effluent limitations has been applied to both CTR and non-CTR constituents in this Order.

   The interim limitations for ammonia in this Order are based on the current treatment plant performance and were developed as discussed in section IV.D.6, above.

   Interim limitations for Title 22 (or equivalent) requirements (i.e., for BOD_5, total coliform organisms, and TSS) are established at the levels recommended by DPH for secondary treatment-level disinfection.

   The Central Valley Water Board finds that the Discharger can undertake source control and treatment plant measures to maintain compliance with the interim limitations included in this Order. Interim limitations are established when compliance with final effluent limitations cannot be achieved by the existing discharge. Discharge of constituents in concentrations in excess of the final effluent limitations, but in compliance with the interim effluent limitations, can significantly degrade water quality and adversely affect the beneficial uses of the receiving stream on a long-term basis. The interim limitations, however, establish an enforceable ceiling concentration until compliance with the effluent limitation can be achieved. The limited, short-term degradation associated with the compliance schedule is consistent with State and federal policies and is authorized by 40 CFR 122.47 and the Compliance Schedule Policy.

F. Land Discharge Specifications – Not Applicable

G. Reclamation Specifications – Not Applicable

Treated wastewater discharged for reclamation is regulated under separate waste discharge requirements and must meet the requirements of CCR, Title 22.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

Basin Plan water quality objectives to protect the beneficial uses of surface water and groundwater include numeric objectives and narrative objectives, including objectives for chemical constituents, toxicity, and tastes and odors. The toxicity objective requires that surface water and groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants, animals, or aquatic life. The chemical constituent objective requires that surface water and groundwater shall not contain chemical constituents in concentrations that adversely affect any beneficial use or that exceed the maximum contaminant levels (MCLs) in Title 22, CCR. The tastes and odors objective states that surface water and groundwater shall not contain taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses. The Basin Plan requires the application of the most stringent objective necessary to ensure that surface water and groundwater do not contain chemical constituents, toxic substances, radionuclides, or taste and odor producing substances in concentrations that adversely affect domestic drinking water supply, agricultural supply, or any other beneficial use.

A. Surface Water

1. CWA section 303(a-c), requires states to adopt water quality standards, including criteria where they are necessary to protect beneficial uses. The Central Valley Water Board adopted water quality criteria as water quality objectives in the Basin Plan. The Basin Plan states that "[t]*he numerical and narrative water quality objectives define the least stringent standards that the Regional Water Board will apply to regional waters in order to protect the beneficial uses.*" The Basin Plan includes numeric and narrative water quality objectives for various beneficial uses and water bodies. This Order contains receiving surface water limitations based on the Basin Plan numerical and narrative water quality objectives for bacteria, biostimulatory substances, color, chemical constituents, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, suspended sediment, settleable substances, suspended material, tastes and odors, temperature, toxicity, and turbidity.

B. Groundwater

1. The beneficial uses of the underlying ground water are municipal and domestic supply, industrial service supply, industrial process supply, and agricultural supply.

2. Basin Plan water quality objectives include narrative objectives for chemical constituents, tastes and odors, and toxicity of groundwater. The toxicity objective

requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants, animals, or aquatic life. The chemical constituent objective states groundwater shall not contain chemical constituents in concentrations that adversely affect any beneficial use. The tastes and odors objective prohibits taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses. The Basin Plan also establishes numerical water quality objectives for chemical constituents and radioactivity in groundwaters designated as municipal supply. These include, at a minimum, compliance with MCLs in Title 22 of the CCR. The bacteria objective prohibits coliform organisms at or above 2.2 MPN/100 mL. The Basin Plan requires the application of the most stringent objective necessary to ensure that waters do not contain chemical constituents, toxic substances, radionuclides, taste- or odor-producing substances, or bacteria in concentrations that adversely affect municipal or domestic supply, agricultural supply, industrial supply or some other beneficial use.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

40 CFR 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorizes the Central Valley Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (Attachment E) of this Order, establishes monitoring and reporting requirements to implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the Monitoring and Reporting Program for the Facility.

A. Influent Monitoring

1. Influent monitoring is required to collect data on the characteristics of the wastewater and to assess compliance with effluent limitations (e.g., BOD_5 and TSS reduction requirements). The monitoring frequencies for flow (continuous), BOD_5 and Total Suspended Solids once per day) have been retained from Order No. 5-00-188. In addition, pH (continuous), electrical conductivity (once per week) and total dissolved solids (once per month) are monitored for a more complete characterization of the influent.

2. Influent monitoring is required to collect data on the characteristics of the Groundwater Corrective Action Program (CAP) Discharge Monitoring. The monitoring frequencies for flow (once per month), priority pollutants, total dissolved solids, electrical conductivity and nitrates (twice per year) have been retained from Order No. 5-00-188.

B. Effluent Monitoring

1. Pursuant to the requirements of 40 CFR 122.44(i)(2) effluent monitoring is required for all constituents with effluent limitations. Effluent monitoring is necessary to assess compliance with effluent limitations, assess the effectiveness of the

treatment process, and to assess the impacts of the discharge on the receiving stream and groundwater.

2. Effluent monitoring frequencies and sample types for flow, chlorine residual, sulfur dioxide, temperature, pH, BOD, TSS, total coliforms, ammonia, settleable solids, electrical conductivity, total dissolved solids, total organic carbon, cyanide, arsenic, mercury, copper, silver, methylene chloride, lead, tetrachloroethylene, bis(2-ethylhexyl) phthalate, chlorodibromomethane, dichlorobromomethane, carbon tetrachloride, MTBE, hardness, alkalinity, standard minerals, and priority pollutants have been retained from Order No. 5-00-188 to determine compliance with effluent limitations for these parameters.

3. Monitoring data collected over the existing permit term for lindane, lead, zinc, silver and arsenic did not demonstrate reasonable potential to exceed water quality objectives/criteria. Thus, specific monitoring requirements for these parameters have not been retained from Order No. 5-00-188.

4. This Order specifies lower reporting limits sufficient for comparison with the applicable water quality objectives as follows:

Pentachlorophenol	µg/L	EPA method 625 w/ MDL 0.05 µg/L
Dibenzo(a,h)anthracene	µg/L	EPA method 625 w/MDL 0.001-0.005 µg/L
N-nitrosodimethylamine	ng/L	EPA Method 521
Chlorpyrifos	µg/L	EPA Method 625M; Method 8141 or equivalent
Diazinon	µg/L	EPA Method 625M; Method 8141 or equivalent

5. In addition to priority pollutant data for the effluent, non-priority pollutants also need to be monitored to conduct a meaningful reasonable potential analysis. Similar to priority pollutant monitoring, periodic monitoring for non-priority pollutants is needed to provide the data necessary for determining the reasonable potential for those pollutants for which no WQBELs were established. Thus, monitoring for non-priority pollutants include pyrethroids, nitrosoamines, dioxin and congeners, furans, persistent chlorinated hydrocarbon pesticides and other constituents of concern as described in Table E-4.

6. In order to determine compliance with the effluent limitations, aluminum, methylmercury, manganese, pentachlorophenol, dibenzo(ah)anthracene, chlorpyrifos, diazinon, and N-nitrosodimethylamine are include in the effluent monitoring at minimum frequencies .

7. In addition to the constituents addressed above, perchlorate and 1,2-diphenyl hydrazine in the effluent may have reasonable potential to impact municipal beneficial uses. Perchlorate was detected in the effluent 11 out of 81 samples above the water quality criteria, however, the analytical method was not appropriate for wastewater and could give false positive detections due to salt interferences. 1,2- diphenyl hydrazine wa detected by two J-flagged samples. Therefore, to determine if perchlorate has reasonable potential this Order requires the Discharge conduct a special study for perchlorate and for 1,2-diphenyl hydrazine.

8. The California Department of Public Health (DPH) recommends a 1 in 10,000 risk and a 1 log removal of *cryptosporidium* and *giardia*. Therefore, weekly monitoring for these pathogenic protozoans is required to meet the recommendations.

9. Timing, duration and purpose of wastewater diversions, effluent or influent, is a measure of proper operation of the wastewater treatment plant and is required to be reported on a monthly basis.

C. Whole Effluent Toxicity Testing Requirements

1. **Acute Toxicity.** Flow through 96-hour bioassay testing is required to demonstrate compliance with the effluent limitation for acute toxicity. The test species have changed from fathead minnow *(Pimephales promela)* to rainbow trout (*Oncorhynchus mykiss*) because rainbow trout are salmonids similar to resident species and are more sensitive than fathead minnows to wastewater effluent. Using fathead minnows may underestimate effluent toxicity.

2. **Chronic Toxicity.** Monthly chronic whole effluent toxicity testing is required in order to demonstrate compliance with the Basin Plan's narrative toxicity objective. Order No. 5-00-188 included chronic toxicity testing quarterly, the TSD recommends monthly chronic toxicity testing for major wastewater treatment facilities.

D. Receiving Water Monitoring

1. Surface Water

Receiving water monitoring is necessary to assess compliance with receiving water limitations and to assess the impacts of the discharge on the receiving stream. New monitoring locations have been added at River Mile 44 and River Mile 43, RSWD-004 and RSWD-005, respectively, to better evaluate impacts in the receiving water.

2. Groundwater (Not Applicable)

E. Other Monitoring Requirements

1. Biosolids Monitoring

Biosolids monitoring is required to ensure compliance with the biosolids disposal requirements contained in the Special Provision contained in section VI.C.6.a. of this Order. Biosolids disposal requirements are imposed pursuant to 40 CFR Part 503 to protect public health and prevent groundwater degradation.

2. Water Supply Monitoring

Water supply monitoring is required to evaluate the source of constituents in the wastewater.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions

Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment D. The discharger must comply with all standard provisions and with those additional conditions that are applicable under 40 CFR 122.42.

40 CFR 122.41(a)(1) and (b) through (n) establish conditions that apply to all State-issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to the regulations must be included in the Order. 40 CFR 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. In accordance with 40 CFR 123.25, this Order omits federal conditions that address enforcement authority specified in 40 CFR 122.41(j)(5) and (k)(2) because the enforcement authority under the CWC is more stringent. In lieu of these conditions, this Order incorporates by reference CWC section 13387(e).

B. Special Provisions

1. Reopener Provisions

a. **Temperature Study.** There are uncertainties that the discharge may impact aquatic life in the vicinity of the discharge as regulated under the existing thermal exemption conditions. This Order requires the Discharger to complete a study of temperature's potential effect in the receiving water. This reopener provision allows the Central Valley Water Board to reopen this Order for modification of effluent limitations and receiving water limitations and requirements for temperature if after review of the study results it is determined that the discharge impacts beneficial uses.

b. **Pollution Prevention.** This Order requires the Discharger prepare pollution prevention plans following CWC section 13263.3(d)(3) for ammonia and mercury. This reopener provision allows the Central Valley Water Board to reopen this Order for addition and/or modification of effluent limitations and requirements for these constituents based on a review of the pollution prevention plans.

c. **Whole Effluent Toxicity.** This Order requires the Discharger to investigate the causes of, and identify corrective actions to reduce or eliminate effluent toxicity through a Toxicity Reduction Evaluation (TRE). This Order may be reopened to include a numeric chronic toxicity limitation, a new acute toxicity limitation, and/or a limitation for a specific toxicant identified in the TRE. Additionally, if a numeric chronic toxicity water quality objective is adopted by the State Water Board, this Order may be reopened to include a numeric chronic toxicity limitation based on that objective.

d. **Water Effects Ratio (WER) and Metal Translators.** A default WER of 1.0 has been used in this Order for calculating CTR criteria for applicable priority pollutant inorganic constituents. In addition, default dissolved-to-total metal translators have been used to convert water quality objectives from dissolved to total recoverable when developing effluent limitations for copper. If the Discharger performs studies to determine site-specific WERs and/or site-specific dissolved-to-total metal translators, this Order may be reopened to modify the effluent limitations for the applicable inorganic constituents.

e. **Perchlorate and 1,2-diphenyl hydrazine Studies.** There are indications that the discharge may contain constituents that have a reasonable potential to cause or contribute to an exceedance of water quality objectives. This Order requires the Discharger to complete a study of these constituents' potential effect in the receiving water. This reopener provision allows the Central Valley Water Board to reopen this Order for addition of effluent limitations and requirements for these constituents if after review of the study results it is determined that the discharge has reasonable potential to cause or contribute to an exceedance of a water quality objective.

f. **Central Valley Drinking Water Policy**. If water quality objectives are adopted for organic carbon, nutrients, salinity, bromide, or pathogens to protect drinking water supplies in the Central Valley Region, this Order may be reopened for addition and/or modification of effluent limitations and requirements, as appropriate, to require compliance with the applicable water quality objectives.

g. **Ammonia Studies.** The ammonia effluent limitations in this Order are based on USEPA's recommended National Ambient Water Quality Criteria for protection of aquatic life. However, studies are ongoing to evaluate the effect of ammonia on the inhibition of growth of diatoms in the Bay-Delta, studies to evaluate the sensitivity of delta smelt to ammonia toxicity, and studies of the technological feasibility of ammonia removal processes. Based on the result of these studies, this Order may be reopened to modify the ammonia effluent limitations, as appropriate.

h. ***Hyalella azteca* Study**. There are indications that the discharge may contain constituents that are toxic to native species at very low levels.[1] *Hyalella azteca* is a native species in the Sacramento-San Joaquin Delta, it is sensitive to pyrethroids and it is an interface organism between sediment and the water column. Although testing with *Hyalella azteca* is not commonly used for wastewater effluent, it is a common species for determining toxicity in the Delta. Researchers are using a modified version of Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, USEPA Method #600-R-99-064. A study is needed to determine if a 4 or 10 water column test for growth or 10 day survival or both growth and survival is best for determining toxicity.

i. **Regional Monitoring Program.** The State and Regional Water Boards are committed to creation of a coordinated Regional Monitoring Program to address receiving water monitoring in the Delta for all Water Board regulatory and research programs. When a Regional Monitoring Program becomes functional, this permit may be reopened to make appropriate adjustments in permit-specific monitoring to coordinate with the Regional Monitoring Program."

j. **The Bay-Delta Plan**. The South Delta salinity standards are currently under review by the State Water Board in accordance with implementation provisions contained in the Bay-Delta Water Quality Control Plan. This review in process includes an updated independent scientific investigation of irrigation salinity needs in the southern Delta. If applicable water quality objectives of the Bay-Delta Plan are adopted, this Order may be reopened for addition and/or modification of effluent limitations and requirements, as appropriate.

2. Special Studies and Additional Monitoring Requirements

a. **Chronic Whole Effluent Toxicity Requirements.** The Basin Plan contains a narrative toxicity objective that states, "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at page III-8.00). The discharge may contain chronic WET that has reasonable potential to cause or contribute to an in-stream excursion above of the Basin Plan's narrative toxicity objective.

This provision requires the Discharger to update its TRE Workplan in accordance with USEPA guidance. In addition, the provision provides a numeric toxicity

[1] Weston, Donald P., "Urban and Agricultural Sources of Pyrethroid Insecticides to the Sacramento-San Joaquin Delta of Califronia", Environmental Science & Technology, Vol. 44, No. 5, 2010.

monitoring trigger and requirements for accelerated monitoring, as well as, requirements for TRE initiation if toxicity has been demonstrated.

Monitoring Trigger. As discussed in Section IV.C.2.d, above, this Order allows a chronic aquatic toxicity mixing zone. The chronic toxicity mixing zone extends 350 feet downstream of the outfall. A numeric toxicity monitoring trigger of **8** TUc (where TUc = 100/NOEC) is applied in the provision, allowing for the dilution granted within the mixing zone. Therefore, a TRE is triggered when the effluent exhibits toxicity at 12.5% effluent. The numeric monitoring trigger represents the in-stream waste concentration at the edge of the chronic mixing zone. The in-stream waste concentration is the concentration of the effluent in the receiving water after mixing (i.e., inverse of the dilution factor). The Discharger has conducted extensive modeling of the discharge and has estimated the 4-day average dilution at the edge of the chronic mixing zone. Table **F**-20, below, shows modeling results for the percent effluent 350 feet from the diffuser that was provided by the Discharger as part of its comments on the Tentative Order.

Table F-20. Dyntox Model Results for Percent Effluent 350 Feet from the SRWTP Diffuser at 181 mgd

	4-Day Average 350 Feet from Diffuser	
Statistic	Percent Effluent	Dilution
Mean	3.93	25.5
Median	3.94	25.4
95%-ile	6.35	15.8
99.91%-ile	7.50	13.3
5%-ile	1.91	52.4

Based on the results of the modeling shown in Table **F**-20, above, the 4-day average effluent concentration at the edge of the chronic mixing zone, with a one-in-three year exceedance (i.e., 99.91 percentile), is 7.5 percent. This corresponds to a toxicity trigger of 13.3 TUc. Although the modeling demonstrates a chronic toxicity trigger of 13.3 TUc at the edge of the chronic mixing zone, the toxicity trigger has been set at 8 TUc, which is the toxicity trigger in Order 5-00-188 (previous Order). The Discharger has shown consistent compliance with this trigger and it will require proactive efforts to evaluate effluent toxicity before chronic toxicity is experienced outside the chronic toxicity mixing zone.

Accelerated Monitoring. The provision requires accelerated WET testing when a regular WET test result exceeds the monitoring trigger. The purpose of accelerated monitoring is to determine, in an expedient manner, whether there is toxicity before requiring the implementation of a TRE. Due to possible seasonality of the toxicity, the accelerated monitoring should be performed in a timely manner, preferably taking no more than 2 to 3 months to complete.

The provision requires accelerated monitoring consisting of four chronic toxicity tests in a six-week period (i.e., one test every two weeks) using the species that exhibited toxicity. Guidance regarding accelerated monitoring and TRE initiation is provided in the *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001, March 1991 (TSD). The TSD at page 118 states, "*EPA recommends if toxicity is repeatedly or periodically present at levels above effluent limits more than 20 percent of the time, a TRE should be required.*" Therefore, four accelerated monitoring tests are required in this provision. If no toxicity is demonstrated in the four accelerated tests, then it demonstrates that toxicity is not present at levels above the monitoring trigger more than 20 percent of the time (only 1 of 5 tests are toxic, including the initial test). However, notwithstanding the accelerated monitoring results, if there is adequate evidence of effluent toxicity (i.e. toxicity present exceeding the monitoring trigger more than 20 percent of the time), the Executive Officer may require that the Discharger initiate a TRE.

See the WET Accelerated Monitoring Flow Chart (Figure F-2), below, for further clarification of the accelerated monitoring requirements and for the decision points for determining the need for TRE initiation.

TRE Guidance. The Discharger is required to prepare a TRE Workplan in accordance with USEPA guidance. Numerous guidance documents are available, as identified below:

- Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, EPA/833-B-99/002, August 1999.

- Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (TREs), EPA/600/2-88/070, April 1989.

- Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures, Second Edition, EPA 600/6-91/003, February 1991.

- Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I, EPA/600/6-91/005F, May 1992.

- Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity, Second Edition, EPA/600/R-92/080, September 1993.

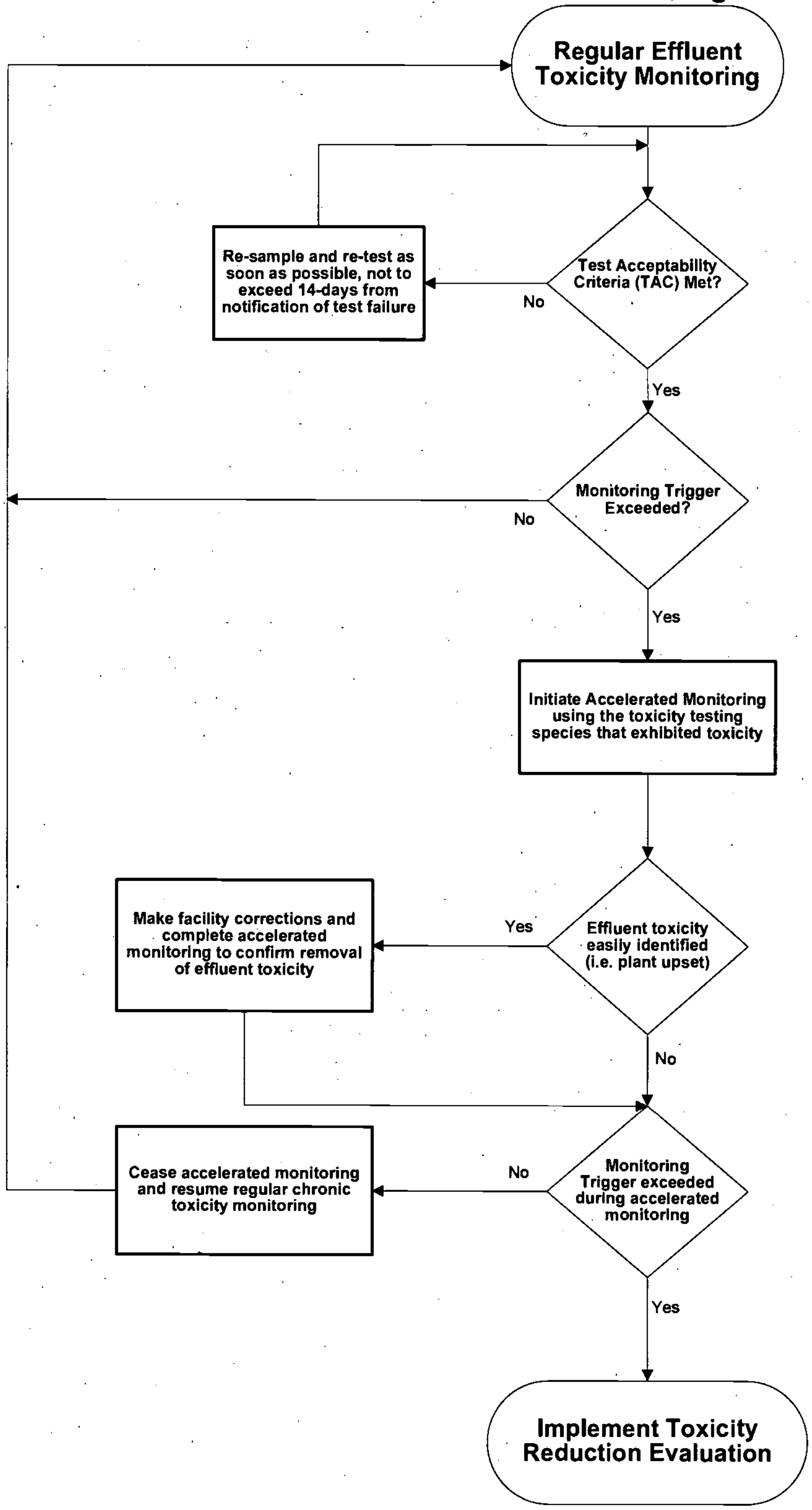
- Methods for Aquatic Toxicity Identification Evaluations: Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity, Second Edition, EPA 600/R-92/081, September 1993.

- Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition, EPA-821-R-02-012, October 2002.

- Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA-821-R-02-013, October 2002.

- Technical Support Document for Water Quality-based Toxics Control, EPA/505/2-90-001, March 1991.

Figure F-2
WET Accelerated Monitoring Flow Chart



b. **Temperature Study**. The Discharger shall submit a workplan and time schedule for Executive Officer approval for determining whether permitted conditions are protective of aquatic life beneficial uses in the Sacramento River. This Order requires the Discharger to submit a workplan and time schedule for Executive Officer approval for determining whether permitted conditions are protective of the aquatic life beneficial uses of the Sacramento River. The work plan shall be implemented upon approval by the Executive Officer. The study will include an evaluation of: (1) the existing Thermal Plan Exception and its effects on aquatic life, and (2) any proposed request for new Thermal Plan Exception(s). The Discharger must consult with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Game, to consider additional issues (such as fish attractively to mixing zone areas) in development of the workplan for the Study.

3. **Best Management Practices and Pollution Prevention**

a. **Salinity Evaluation and Minimization Plan.** An Evaluation and Minimization Plan for salinity is required in this Order to ensure adequate measures are developed and implemented by the Discharger to reduce the discharge of salinity to Sacramento River.

b. **2,3,7,8-TCDD and Other Dioxin and Furan Congeners Source Evaluation and Minimization Plan.** The Discharger will be required to prepare a 2,3,7,8-TCDD and other dioxin and furan congeners evaluation and minimization plan to address sources of detectable dioxins (OCDD and 1,2,3,4,6,7,8-HpCDD) and furans (OCDF) from the Facility. The plan is required in this Order to ensure adequate measures are developed and implemented by the Discharger to reduce the discharge of dioxin and furan congeners to the receiving water.

4. **Construction, Operation, and Maintenance Specifications**

a. **Emergency Storage Basin Operating Requirements.** The operation and maintenance specifications for the emergency storage basin are necessary to ensure proper operation of the emergency storage basin and minimize the potential for impacts to groundwater quality.

b. **Turbidity.** Operations specifications for turbidity are included as an indicator of the effectiveness of the treatment process and to assure compliance with effluent limitations for total coliform organisms. The tertiary treatment process is capable of reliably meeting a turbidity limitation of 2 nephelometric turbidity units (NTU) as a daily average. Failure of the treatment system such that virus removal is impaired would normally result in increased particles in the effluent, which result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. The operational specification requires that turbidity shall not exceed 2 NTU as a daily average; 5 NTU, more than 5 percent of the time within a 24-hour period; and an instantaneous maximum of 10 NTU.

5. Special Provisions for Municipal Facilities (POTWs Only)

a. **Pretreatment Requirements.** The federal CWA section 307(b), and federal regulations, 40 CFR Part 403, require publicly owned treatment works to develop an acceptable industrial pretreatment program. A pretreatment program is required to prevent the introduction of pollutants, which will interfere with treatment plant operations or sludge disposal, and prevent pass through of pollutants that exceed water quality objectives, standards or permit limitations. Pretreatment requirements are imposed pursuant to 40 CFR Part 403.

The Discharger shall implement and enforce its approved pretreatment program and is an enforceable condition of this Order. If the Discharger fails to perform the pretreatment functions, the Central Valley Water Board, the State Water Board or USEPA may take enforcement actions against the Discharger as authorized by the CWA.

b. The State Water Board issued General Waste Discharge Requirements for Sanitary Sewer Systems, Water Quality Order No. 2006-0003-DWQ (General Order) on 2 May 2006. The General Order requires public agencies that own or operate sanitary sewer systems with greater than one mile of pipes or sewer lines to enroll for coverage under the General Order. The General Order requires agencies to develop sanitary sewer management plans (SSMPs) and report all sanitary sewer overflows (SSOs), among other requirements and prohibitions.

Furthermore, the General Order contains requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows. Inasmuch that the Discharger's collection system is part of the system that is subject to this Order, certain standard provisions are applicable as specified in Provisions, section VI.C.5. For instance, the 24-hour reporting requirements in this Order are not included in the General Order. The Discharger must comply with both the General Order and this Order. The Discharger and public agencies that are discharging wastewater into the facility were required to obtain enrollment for regulation under the General Order by 1 December 2006.

6. Other Special Provisions

a. **Ownership Change.** To maintain the accountability of the operation of the Facility, the Discharger is required to notify the succeeding owner or operator of the existence of this Order by letter if, and when, there is any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger.

7. Compliance Schedules

a. The Discharger submitted a request, and justification (dated 20 August 2010), for a compliance schedule for BOD_5, TSS, ammonia, and total coliform organisms.

The compliance schedule justification included all items specified in Paragraph 3, items (a) through (d), of section 2.1 of the SIP. This Order establishes a compliance schedule for the new, final WQBELs for BOD_5, TSS, ammonia, and total coliform organisms and requires full compliance by 1 December 2020.

b. A pollution prevention plan for ammonia and for mercury is required in this Order per CWC section 13263.3(d)(1)(C). In accordance with CWC section 13263.3(d)(3), the pollution prevention plans for ammonia and mercury shall, at a minimum, meet the following requirements:

(1) An estimate of all of the sources of a pollutant contributing, or potentially contributing, to the loadings of a pollutant in the treatment plant influent.

(2) An analysis of the methods that could be used to prevent the discharge of the pollutants into the Facility, including application of local limits to industrial or commercial dischargers regarding pollution prevention techniques, public education and outreach, or other innovative and alternative approaches to reduce discharges of the pollutant to the Facility. The analysis also shall identify sources, or potential sources, not within the ability or authority of the Discharger to control, such as pollutants in the potable water supply, airborne pollutants, pharmaceuticals, or pesticides, and estimate the magnitude of those sources, to the extent feasible.

(3) An estimate of load reductions that may be attained through the methods identified in subparagraph ii.

(4) A plan for monitoring the results of the pollution prevention program.

(5) A description of the tasks, cost, and time required to investigate and implement various elements in the pollution prevention plan.

(6) A statement of the Discharger's pollution prevention goals and strategies, including priorities for short-term and long-term action, and a description of the Discharger's intended pollution prevention activities for the immediate future.

(7) A description of the Discharger's existing pollution prevention programs.

(8) An analysis, to the extent feasible, of any adverse environmental impacts, including cross-media impacts or substitute chemicals that may result from the implementation of the pollution prevention program.

(9) An analysis, to the extent feasible, of the costs and benefits that may be incurred to implement the pollution prevention program.

VIII. PUBLIC PARTICIPATION

The Central Valley Water Board is considering the issuance of WDRs that will serve as an NPDES permit for the Facility. As a step in the WDR adoption process, the Central Valley Water Board staff has developed tentative WDRs. The Central Valley Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Central Valley Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Notification was provided through publication of a Notice of Public Hearing in the Sacramento Bee. The Notice was also posted at the Sacramento City Hall and at the entrance to the Facility.

B. Written Comments

The staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative WDRs. Comments must be submitted either in person or by mail to the Executive Office at the Central Valley Water Board at the address above on the cover page of this Order.

To be fully responded to by staff and considered by the Central Valley Water Board, written comments must be received at the Central Valley Water Board offices by 5:00 p.m. on **8 October 2010.**

C. Public Hearing

The Central Valley Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date:	9 December 2010
Time:	8:30 a.m.
Location:	Regional Water Quality Control Board, Central Valley Region 11020 Sun Center Dr., Suite #200 Rancho Cordova, CA 95670

Interested persons are invited to attend. At the public hearing, the Central Valley Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Please be aware that dates and venues may change. Our Web address is www.waterboards.ca.gov/centralvalley where you can access the current agenda for changes in dates and locations.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Board to review the decision of the Central Valley Water Board regarding the final WDRs. The petition must be received by the State Water Resources Control Board within 30 days of the Central Valley Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The Report of Waste Discharge, related documents, tentative effluent limitations and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday. Copying of documents may be arranged through the Central Valley Water Board by calling (916) 464-3291.

F. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Central Valley Water Board, reference this Facility, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this order should be directed to Ms. Kathy Harder at (916) 464-4778 or kharder@waterboards.ca.gov.

ATTACHMENT G – SUMMARY OF REASONABLE POTENTIAL ANALYSIS

Constituent	Applicable Water Quality Objective/Criteria {Basis} (C)	Maximum Effluent Concentration (MEC)	Receiving Water Concentration (Sacramento River @ Freeport) (B)	Reason for Reasonable Potential
Copper	7.7/3.0[1] {CTR Aquatic Life}	6.34	20.4	B > C
Mercury[2]	0.05 {CTR Human Health}	0.01	0.0892	B > C
Cyanide	5.2 {CTR Aquatic Life}	10	5	MEC > C
Carbon Tetrachloride	0.25 {CTR Human Health}	0.5	<0.1	MEC > C
Chlorodibromomethane	0.41 {CTR Human Health}	0.7	<0.18	MEC > C
Dichlorobromomethane	0.56 {CTR Human Health}	2.5	<0.14	MEC > C
Methylene Chloride	4.7 {CTR Human Health}	5.4	<0.35	MEC > C
Tetrachloroethylene	0.8 {CTR Human Health}	0.9	0.21	MEC > C
Pentachlorophenol	0.28 {CTR Human Health}	5.7	0.026	MEC > C
Bis(2-Ethylhexyl) Phthalate	1.8 {CTR Human Health}	8.1	0.57	MEC > C
Dibenzo(ah) anthracene	0.0044 {CTR Human Health}	0.51	0.0026	MEC > C
N-nitrosodimethylamine	0.00069 {CTR Human Health}	0.044	<0.01	MEC > C
Aluminum	200 {Secondary MCL}	44.4	8800	B > C
Ammonia (mg/L)	1.23[3] {USEPA NAWQC}	45	1.3	B > C & MEC > C
Manganese	50 {Basin Plan}	65	130	B > C & MEC > C
MTBE	5 {Secondary MCL}	5.8	1.9	MEC > C
Chlorpyrifos	0.025 (Basin Plan)	0.039	0.0058	MEC>C

1 Effluent copper criteria is 7.7 µg/L based on a minimum effluent hardness of 80 mg/L (as $CaCO_3$) and background copper criteria is 3.0 µg/L based on a minimum upstream receiving water hardness of 26 mg/L (as $CaCO_3$). Default EPA translators were used.

2 Receiving Water concentration from Coordinated Monitoring Program (CMP) @ Freeport Summary 1992-2008

3 Water quality criteria (chronic criterion) calculated using the maximum upstream receiving water pH of 8.8 and corresponding temperature of 15.1C° that occurred on 10/21/1998

General Notes:

- Effluent data from June 2005-July 2008 from discharger self-monitoring reports (SMRs); Receiving water data from 1992-2008 from SMRs & CMP
- All units in µg/L unless specified
- All metals criteria is expressed as total recoverable
- MCL = Maximum Contaminant Level
- NAWQC = National Ambient Water Quality Criteria
- CTR = California Toxics Rule

ATTACHMENT H – CALCULATION OF WQBELS

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT	Ammonia (acute and chronic dilution)		Ammonia (no dilution)	Copper (acute and chronic dilution)		Copper (no dilution)	Cyanide (acute and chronic dilution)		Cyanide (no dilution)	Chlorpyrifos (acute and chronic dilution)		Chlorpyrifos (no dilution)	Aluminum
Units	mg/L (as N)			ug/L			ug/L			ug/L			ug/L
Applicable Criteria													
Basis and Criteria type	NAWQC			CTR			CTR			Basin Plan			MCL
Acute Aquatic Life Criterion	variable		2.14	variable		11	22			0.025			750
Chronic Aquatic Life Criterion	variable		1.68	variable		7.7	5.2			0.015			750
Human Health Criterion	n/a		n/a	n/a		n/a	n/a			n/a			200
Effluent Concentration Allowance (ECA)													
Ambient Background Concentration	1.5			5.1			2.5			0.006			970
Dilution Credit (acute)	Model		0	Model		0	Model		0	Model		0	Model
Dilution Credit (chronic)	Model		0	Model		0	Model		0	Model		0	Model
Dilution Credit (human health)	n/a		n/a	n/a		n/a	n/a		n/a	n/a		n/a	56
ECA acute	variable		2.14	variable		11	variable		22	0.025		0.025	750
ECA chronic	variable		1.68	variable		7.7	variable		5.2	0.015		0.015	750
ECA Human Health	n/a			n/a			n/a			n/a			200
Effluent Statistics (6/1/2005 - 7/31/2008)													
Number of Samples	334			86			148						67
Mean	24			4.30			4.60			0.01			18.00
Standard Deviation	3.7			0.73			2.5			0.009			5.3
Coefficient of Variation	0.15			0.17			0.54			0.60			0.29
WQBELs Calculations													
σ^2	0.023			0.028			0.259			0.307			0.083
σ_4^2	0.006			0.007			0.071			0.086			0.021
σ^{30}	0.001			n/a			n/a			n/a			n/a
ECA Multiplier acute	0.708			0.685			0.349			0.321			0.533
ECA Multiplier chronic	0.937			0.824			0.557			0.527			0.719
LTA acute	43.9		1.52	6.70		7.54	21.30		7.67	0.019		0.008	399.8
LTA chronic	36.4		1.57	66.00		6.35	13.90		2.90	0.114		0.008	539.3
minimum of LTAs	36.40		1.52	6.70		6.35	13.90		2.90	0.019		0.008	399.8
MDEL mult99	1.412			1.459			2.869			3.114			1.876
AMEL mult95	1.132			1.145			1.497			1.552			1.259
MDEL/AMEL Multiplier	n/a			n/a			n/a			n/a			n/a
WQBELs													
Average Monthly Effluent Limitation	41		1.7	7.7		7.3	21		4.3	0.029		0.012	503
Maximum Daily Effluent Limitation	51		2.1	9.8		9.3	40		8.3	0.059		0.025	750
Annual Average Effluent Limitation	n/a			n/a			n/a			n/a			200
Facility Performance	45			6.8			11			0.120			35

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT	Carbon Tetrachloride (w/dilution)	Carbon Tetrachloride (no dilution)	DBCM (w/dilution)	DBCM (no dilution)	DCBM (w/dilution)	DCBM (no dilution)	Bis(2-ethylhexyl) phthalate (w/dilution)	Bis(2-ethylhexyl) phthalate (no dilution)	Methylene Chloride (w/dilution)	Methylene Chloride (no dilution)	Tetrachloroethylene (w/dilution)	Tetrachloroethylene (no dilution)
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Applicable Criteria												
Basis and Criteria type	(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)	
Acute Aquatic Life Criterion	n/a		n/a		n/a		n/a		n/a		n/a	
Chronic Aquatic Life Criterion	n/a		n/a		n/a		n/a		n/a		n/a	
Human Health Criterion	0.25		0.41		0.56		1.8		4.7		0.8	
Effluent Concentration Allowance (ECA)												
Ambient Background Concentration	0.1		0.2		0.14		0.16		0.35		0.15	
Dilution Credit (acute)	n/a		n/a		n/a		n/a		n/a		n/a	
Dilution Credit (chronic)	n/a		n/a		n/a		n/a		n/a		n/a	
Dilution Credit (human health)	56	0	56	0	56	0	56	0	56	0	56	0
ECA acute	n/a		n/a		n/a		n/a		n/a		n/a	
ECA chronic	n/a		n/a		n/a		n/a		n/a		n/a	
ECA Human Health	8.7	0.25	12.2	0.41	24.1	0.6	93.8	1.8	248	5	37.2	0.8
Effluent Statistics (6/1/2005 - 7/31/2008)												
Number of Samples	73		73		73		87		73		73	
Mean	0.12		0.14		0.92		2.60		0.98		0.18	
Standard Deviation	0.06		0.09		0.51		1.4		0.78		0.12	
Coefficient of Variation	0.60		0.64		0.55		0.54		0.80		0.60	
WQBELs Calculations												
σ^2	0.307		0.346		0.268		0.255		0.491		0.307	
σ_4^2	0.088		0.098		0.074		0.070		0.147		0.086	
σ^{30}	n/a		n/a		n/a		n/a		n/a		n/a	
ECA Multiplier acute	n/a		n/a		n/a		n/a		n/a		n/a	
ECA Multiplier chronic	n/a		n/a		n/a		n/a		n/a		n/a	
LTA acute	n/a		n/a		n/a		n/a		n/a		n/a	
LTA chronic	n/a		n/a		n/a		n/a		n/a		n/a	
minimum of LTAs	n/a		n/a		n/a		n/a		n/a		n/a	
MDEL mult99	3.114		3.304		2.916		2.847		3.991		3.114	
AMEL mult95	1.552		1.595		1.508		1.492		1.748		1.552	
MDEL/AMEL Multiplier	2.01		2.07		1.93		1.91		2.29		2.01	
WQBELs												
Average Monthly Effluent Limitation	9	0.25	12	0.41	24	0.56	94	1.80	248	4.7	37	0.80
Maximum Daily Effluent Limitation	17	0.50	25	0.85	47	1.08	179	3.43	568	10.7	75	1.6
Annual Average Effluent Limitation	n/a		n/a		n/a		n/a		n/a		n/a	
Facility Performance	5.30		2.20		3.4		13.0		5.4		4.4	

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT	Pentachlorophenol (w/dilution)	Pentachlorophenol (no dilution)	Dibenzo(ah)anthracene (w/dilution)	Dibenzo(ah)anthracene (no dilution)	1,2-Diphenyl-hydrazine (w/dilution)	1,2-Diphenyl-hydrazine (no dilution)	NDMA (w/dilution)	NDMA (no dilution)	Manganese (w/dilution)	Manganese (no dilution)	MTBE (w/dilution)	MTBE (no dilution)
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Applicable Criteria												
Basis and Criteria type	(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)		MCL		MCL	
Acute Aquatic Life Criterion	n/a		n/a		n/a		n/a		n/a		n/a	
Chronic Aquatic Life Criterion	n/a		n/a		n/a		n/a		n/a		n/a	
Human Health Criterion	0.28		0.0044		0.04		0.00069		50		5	
Effluent Concentration Allowance (ECA)												
Ambient Background Concentration	0.07		0.001		1		0.02		3.8		0.52	
Dilution Credit (acute)	n/a		n/a		n/a		n/a		n/a		n/a	
Dilution Credit (chronic)	n/a		n/a		n/a		n/a		n/a		n/a	
Dilution Credit (human health)	56	0	56	0	56	0	56	0	58	0	56	0
ECA acute	n/a		n/a		n/a		n/a		n/a		n/a	
ECA chronic	n/a		n/a		n/a		n/a		n/a		n/a	
ECA Human Health	12.0	0.3	0.2	0.0	0.04	0.04	0.00069		2637	50	256	5
Effluent Statistics (6/1/2005 - 7/31/2008)												
Number of Samples	87		116		85		97		34		101	
Mean	0.51		0.32		0.46		0.72		64.00		0.12	
Standard Deviation	0.56		0.24		0.33		0.88		5.7		0.57	
Coefficient of Variation	0.60		0.60		0.60		0.60		0.09		0.60	
WQBELs Calculations												
σ^2	0.307		0.307		0.307		0.307		0.008		0.307	
σ_4^2	0.086		0.086		0.086		0.086		0.002		0.086	
σ^{30}	n/a		n/a		n/a		n/a		n/a		n/a	
ECA Multiplier acute	n/a		n/a		n/a		n/a		n/a		n/a	
ECA Multiplier chronic	n/a		n/a		n/a		n/a		n/a		n/a	
LTA acute	n/a		n/a		n/a		n/a		n/a		n/a	
LTA chronic	n/a		n/a		n/a		n/a		n/a		n/a	
minimum of LTAs	n/a		n/a		n/a		n/a		n/a		n/a	
MDEL mult99	3.114		3.114		3.114		3.114		n/a		n/a	
AMEL mult95	1.552		1.552		1.552		1.552		n/a		n/a	
MDEL/AMEL Multiplier	2.01		2.01		2.01		2.01		n/a		n/a	
WQBELs												
Average Monthly Effluent Limitation	12	0.28	0.19	0.004	0.04		0.00069		n/a		n/a	
Maximum Daily Effluent Limitation	24	0.56	0.39	0.009	0.08		0.00138		n/a		n/a	
Annual Average Effluent Limitation	n/a		n/a		n/a		n/a		2637	50	256	5
Facility Performance	18.0		1.6		6.7		0.3		85.0		18.0	

General Notes: Unless noted othefwise, all concentrations given as total recoverable
1)Cu criteria are total concentrations
2) ECA calculated per Section 1.4.B, Step 2 of SIP. This allows for consideration of dilution
3) Acute and Chronic ECA Multiplier calculate at 99th percentile per Section 1.4.B Step 3 of SIP or per Sections 5.4.1 and 5.5.4 of the TSD
4) Calculation of AMEL and MDEL multipliers assumes sampling frequency n=>4
5) The probability basis for AMEL is 95th percentile per Section 1.4.B, Step 5 of SIP
6) The probability basis for MDEL is 99th percentile per Section 1.4.B, Step 5 of SIP
7) Harmonic Mean Dilution = 58 (used for carcinogins)
8) 30Q5 Dilution = 29 (used for nitrate and perchlorate)
9) Acute and Chronic LTAs developed by the dynamic model for copper, ammonia and cyanide
10) LTA chronic for ammonia is modified to meet NAWQC for Ammonia 1999 Update recommendations
11) Facility performance determined as described in Section IV.D.6. of the Fact Sheet.
12) Acute ammonia criteria based on maximum permitted pH of 7.5
13) Chronic ammonia criterion based on 30-day rolling average pH and temperature measured at R-1 from June 2005 to July 2008
14) CV set equal to 0.6 in accordance with Section 1.4.B, Step 3 of SIP as applicable

ATTACHMENT I – DIOXIN AND FURAN SAMPLING

The CTR includes criteria for 2,3,7,8-tetrachlorodibenzo-pdioxin (2,3,7,8-TCDD). In addition to this compound, there are many congeners of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) that exhibit toxic effects similar to those of 2,3,7,8-TCDD. The USEPA has published toxic equivalency factors (TEFs) for 17 of the congeners. The TEFs express the relative toxicities of the congeners compared to 2,3,7,8-TCDD (whose TEF equals 1.0). In June 1997, participants in a World Health Organization (WHO) expert meeting revised TEF values for 1,2,3,7,8-PentaCDD, OctaCDD, and OctaCDF. The current TEFs for the 17 congeners, which include the three revised values, are shown below:

Toxic Equivalency Factors (TEFs) for 2,3,7,8-TCDD Equivalents

Congener	TEF
2,3,7,8-TetraCDD	1
1,2,3,7,8-PentaCDD	1.0
1,2,3,4,7,8-HexaCDD	0.1
1,2,3,6,7,8-HexaCDD	0.1
1,2,3,7,8,9-HexaCDD	0.1
1,2,3,4,6,7,8-HeptaCDD	0.01
OctaCDD	0.0001
2,3,7,8-TetraCDF	0.1
1,2,3,7,8-PentaCDF	0.05
2,3,4,7,8-PentaCDF	0.5
1,2,3,4,7,8-HexaCDF	0.1
1,2,3,6,7,8-HexaCDF	0.1
1,2,3,7,8,9-HexaCDF	0.1
2,3,4,6,7,8-HexaCDF	0.1
1,2,3,4,6,7,8-HeptaCDF	0.01
1,2,3,4,7,8,9-HeptaCDF	0.01
OctaCDF	0.0001

Pursuant to Section 13267 of the California Water Code, the Discharger shall conduct effluent and receiving water monitoring, at EFF-001 and RSWU-001, respectively, for the 2,3,7,8-TCDD congeners listed above to assess the presence and amounts of the congeners being discharged and present in the receiving water. For the 2013 calendar year and every other calendar year thereafter, the effluent and upstream receiving water shall be monitored for the presence of the 17 congeners once during dry weather and once during wet weather. The semi-annual monitoring results shall be submitted by **1 February** of the year following the calendar year of monitoring, and shall be submitted with the effluent and receiving water monitoring report containing the monitoring results as required by section IV.B. and section VIII.A.2. of the MRP.
The Discharger shall report, for each congener, the analytical results of the effluent and receiving water monitoring, including the quantifiable limit and the method detection limit, and the measured or estimated concentration.

In addition, the Discharger shall multiply each measured or estimated congener concentration by its respective TEF value and report the sum of these values.

ATTACHMENT J – AMMONIA-RELATED ISSUES

Ammonia-Related Issues

The Discharger's undiluted effluent contains ammonia and other chemicals in toxic concentrations. The SRWTP discharges approximately 14 tons of ammonia daily to the Sacramento River at Freeport. The ammonia toxicity is demonstrated by the numerous acute toxicity violations[1], and ammonia studies by Dr. Werner[2] and by Dr.Teh[3]. Recent Pelagic Organism Decline (POD) has been documented in Sommer, T., C. Armor, R. Baxter, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K. Souza. 2007. The collapse of pelagic fishes in the upper San Franisco Estuary. Fisheries 32(6):270-277.

POD related hypotheses include that ammonia from the SRWTP maybe; (1) inhibiting diatom primary production in the Sacramento River downstream of the discharge point, in Suisun Bay and in the Delta, (2) causing acute and/or chronic toxicity to delta smelt and *Pseudodiaptomus forbesi*, an important food organism for larval and juvenile fish, and (3) causing a shift in the algal community from nutritious species of diatoms to less desirable forms like *Microcystis (blue green algae)*.

<u>Ammonia Toxicity Criteria</u> – Ammonia is toxic to aquatic life with the toxicity varying with the species and with the pH and temperature of the water. Numeric water quality criteria to address both acute and chronic toxicity have been developed by USEPA in its "1999 Update of Ambient Water Quality Criteria for Ammonia" (September 1999). In the USEPA ammonia criteria, acute ammonia toxicity is represented by the effect on salmonids with acute ammonia toxicity increasing with increasing pH. Acute toxicity is represented by the death of the salmonid indicator species. Chronic ammonia toxicity is represented by the effects on fish early life stages, with chronic ammonia toxicity increasing with increasing pH and temperature. Chronic toxicity is represented by the end points: growth, reproduction and survival of the indicator fish early life stages. The discharge, when the approved mixing zones are considered, is in compliance with current USEPA acute and chronic ammonia criteria.

<u>Acute Ammonia Toxicity</u> -Recent studies show Delta smelt are as acutely sensitive to ammonia as salmonids[4] are. Thus the USEPA acute ammonia criteria are protective of the

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[1] 1 July 2009 and 12 January 2010 Notices of Violations to Ms. Mary Snyder from Mr. Victor R. Vasquez, Senior Engineer for the NPDES Compliance and Enforcement Unit, Central Valley Regional Water Quality Control Board

[2] Werner, I, "Effects of Ammonia/um and Other Wastewater Effluent Associated Contaminants on Delta Smelt", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

[3] Teh, S.J., "Acute Toxicity of Ammonia, Copper, and Pesticides to Key Copepods, *Pseudodiaptomus forbesi* and *Eurytemora affinis*, of the San Francisco Estuary", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

[4] Werner, I, L Deanovic, M. Stillway, D. Markiewicz 2008. The effects of wastewater treatment effluent associated contaminants on delta smelt. Final Report to the State Water Resources Control Board, p 60 and Werner, I, L

Delta smelt. However, recent studies on ammonia and the POD of the Delta indicate USEPA's criteria may not be adequately protective of some other sensitive resident Delta species. [1,2] Dr. Swee Teh from the U.C. Davis School of Veterinary Medicine reported at the Ammonia Summit on the results of acute toxicity testing with two copepods, *Eurytemora affinis* and *Pseudodiaptomus forbesi*. Both invertebrate species are important forage organisms for larval fish, including Delta Smelt, in the Delta. Ten percent mortality occurred to both invertebrate species at ambient ammonia concentrations present in the river below the SRWTP.

Chronic Ammonia Toxicity – Research shows varied results for chronic toxicity from the Discharger's ammonia. There is currently no method for assessing chronic toxicity to delta smelt. Where no method exists, acute to chronic ratios (ACRs) for other freshwater fish species are often used to predict potential chronic toxicological endpoints. ACRs are calculated by dividing the 96-hour LC_{50} by the lowest chronic NOEC value. The USEPA (1999) has reported ACR ammonia ratios for six species that ranged between 2 and 21[3]. The lowest reported 96-hour LC_{50} for smelt was >0.116 mg/l un-ionized ammonia (Werner *et al.*, 2009). For smelt, dividing 0.116 by 21 results in an estimated chronic NOEC for smelt of 0.0055 mg/l un-ionized ammonia.

During a Central Valley Water Board study, "Draft Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta"[4], none of the upper 95 percent confidence limits of un-ionized ammonia in the Delta exceeded 0.0055 mg/l suggesting that chronic smelt toxicity is unlikely to have occurred. This conclusion is different from that of Werner *et al.* (2008, 2009). Werner *et al.* concluded that chronic smelt toxicity was possible because of the higher pH values measured in summer in their study. According to Werner, repeated excursions above a pH value of 8.0 would indicate the potential for chronic smelt toxicity.

Dr. Swee Teh also used an ACR analysis and concluded that ambient ammonia concentrations downstream of the SRWTP discharge point might be causing chronic toxicity to both *Eurytemora affinis* and *Pseudodiaptomus forbesi* species. Dr. Teh recommended follow up chronic toxicity studies with invertebrate species. Thirty-day full-life cycle tests were conducted with *P. forbesi* to evaluate the possibility of chronic instream ammonia toxicity. Preliminary testing has now been completed and Dr. Teh reported at 6 July 2010 IEP Contaminant Work Team meeting that *P. forbesi* reproduction and survival was negatively effected by ammonia concentrations as low as 0.36 mg N/L. Ammonia concentrations of this magnitude were measured by the Central Valley Water Board staff in 2009 and 2010 between

Deanovic, M. Stillway, D. Markiewicz 2009. Acute toxicity of ammonia/um and wastewater treatment effluent-associated contaminants on delta smelt—2009. Final Report to the State Water Resources Control Board, p 63.

[1] Johnson, M. L. "Species Sensitivity Distributions and Exposure Concentrations; Placing Recent Results in Context", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.
[2] Teh, S.J., "Acute Toxicity of Ammonia, Copper, and Pesticides to Key Copepods, *Pseudodiaptomus forbesi* and *Eurytemora affinis*, of the San Francisco Estuary", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.
[3] The ACR of 21 was from a full life cycle test with fathead minnows (Thurston *et al.*, 1986). The chronic NOEC endpoint was the highest ammonia concentrations not causing any detrimental histopathological effect.
[4] Foe, Chris, "Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta", May 2010.

the SRWTP and for about 30 miles downstream of the SRWTP[3]. Dr. Teh completed additional experiments and confirmed the *P. forbesi* findings. Dr. Teh concluded *P. forbesi* is more sensitive to total ammonia nitrogen at lower pH and the ionized fraction is more toxic than unionized fraction of ammonia to *P. forbesi.* The Low Observed Effect Concentration (LOEC) of 0.36 mg/L from chronic 31-day study indicated total ammonia at environmentally relevant concentrations of 0.3 to 0.6 mg/L as seen in the Cache Slough regions may pose significant effect on the survival and population of *P. forbesi*. Reproduction performance, i.e., time for female to be gravid and surviving of newborn to the juvenile stages, of P. forbesi is affected by ammonia at concentration ≥ 0.36 mg/L[1].

Proposed 2009 USEPA Ammonia Criteria – USEPA is in the process of updating its ammonia criteria. USEPA released the "Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater" in December 2009. These criteria would update the 1999 Ammonia criteria currently used by the Central Valley Water Board to develop ammonia effluent limitations to implement the Basin Plan's narrative toxicity objective. The major change to the criteria is the addition of more stringent ammonia chronic criteria specific to freshwater mussels. The criteria are revised to protect freshwater Unionid mussels. Unionid mussels are more sensitive than larval fish to ammonia. The proposed chronic ammonia critera with freshwater mussels present is about five to ten times lower than the 1999 chronic criteria for juvenile fish. Table K-1 below compares the most stringent 1999 criteria (fish early life stages present) to the proposed 2009 chronic ammonia criteria for freshwater mussels.

TABLE K-1 TEMPERATURE AND PH-DEPENDENT VALUES - AMMONIA CHRONIC CRITERION: USEPA AMMONIA CRITERIA 1999 FISH EARLY LIFE STAGES PRESENT TO PROPOSED 2009

Species	pH @ 7.5	Temperature, °C					
		14	16	18	20	22	24
Fish early life stages present	**1999**	**4.36**	**3.97**	**3.49**	**3.06**	**2.69**	**2.37**
Freshwater mussels	**2009**	**0.933**	**0.82**	**0.721**	**0.634**	**0.577**	**0.49**

The freshwater Unionid mussel *Anadonata* sp. is present in the Sacramento watershed above the City of Sacramento and in the Delta (personal communication, Jeanette Howard)[2]. It is not known whether the mussel is in the lower Sacramento River near the SRWTP. However, *Anadonata* disperses during a larval stage in which it attaches to passing fish. *Anadonata* is present above the SRWTP, therefore, it is likely that *Anadonata* is present in the lower River. If so, then the new draft ammonia criteria for protection of mussels would apply.

A site-specific chronic mussel criterion was calculated for each field sample collected by Central Valley Water Board staff. The USEPA (2009) formula was used to calculate each criterion and then was compared to ambient ammonia levels in the Delta collected during the year long CVRWQB nutrient study. Ambient concentrations never exceeded the criteria. A safety factor was calculated by dividing ambient ammonia concentrations by the estimated site

[1] November 10, 2010 letter from Dr. Swee Teh, Universisity of California, Davis to Dr. Chris Foe, CVRWQCB.
[2] Personal Communications with Dr. Jeanette Howard, March 10, 2010 with Chris Foe, CVWQCB and 17 & 18 March with Kathy Harder, CVWQCB.

specific chronic mussel criteria. The margin of safety for the Sacramento River above the SRWTP (Tower Bridge and at Garcia Bend) was the highest observed in the system. The safety factor decreased to the lowest level at Hood. Many of the calculated monthly safety factor values for Hood were between one and two indicating a very small margin of safety. Values increased downstream of Hood. About 20 miles downstream of Hood, the average safety factor for Rio Vista was about six[1].

The Central Valley Water Board results from the nutrient study are consistent with the conclusions of Dr. Diana Engle of Larry Walker Associates who compared ambient ammonia concentrations collected in the Sacramento River and Delta by the Interagency Ecological Program between 1974 and 2000[2]. Dr. Engle's evaluation had only one exceedance of the chronic 1999 criteria was reported in nearly 12,000 measurements. However the Central Valley Water Board evaluation did not include the ammonia, temperature and pH data for R-3, at Cliff's Marina about 4200 feet downstream of the SWRTP discharge point and outside of the Discharger's requested mixing zone. Analysis of the R-3 data concluded USEPA 1999 acute criteria was never exceeded. The State Water Contractors compared ambient ammonia levels immediately outside the SRWTP mixing zone with the draft 2009 USEPA ammonia criteria. The 2009 criteria were exceeded 21 percent of the time between 2007 and 2008 and 41 percent of the time in 2009[3].

<u>Additive and Synergistic Toxicity</u> – In 2008, Dr. Teh conducted tests on Sacramento River water at Hood, about 8 miles downstream of the SRWTP discharge point. His results showed 95% mortality to *Eurytemora affinis*, a Delta copepod and food for Delta smelt. Further studies[4] completed by Dr. Teh, indicate the Delta copepods, *Pseudodiaptomus forbesi* and *E. affinis* are very sensitive to combined concentrations of ammonia and copper.

Additionally, a study conducted by Dr. Inge Werner[5] evaluated parallel toxicity tests using Sacramento River water seeded with ammonium chloride and another seeded with SRWTP effluent to match the same ammonia concentrations. Dr. Werner's study showed that the test performed with SRWTP effluent was statistically 30-40% more toxic than the test performed with river water seeded with ammonium chloride. This may be an indication that there are additional toxicants present in the SRWTP effluent that are resulting in chronic toxicity to aquatic species.

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[1] Foe, Chris, "Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta", May 2010.

[2] Engle, D.L., & G. Lau (2010) Does Ammonia Exceed Toxicity Thresholds in the Upper San Francisco Estuary? A comparison of Ambient Data and Toxicity Thresholds for 1974-2010. Interagency Ecological Program (IEP) Annual Workshop, Sacramento, CA.

[3] State Water Contractors, Comments on Aquatic Life and Wildlife Preservation Issues Concerning the Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal, 1 June 2010.

[4] Teh, S.J., "Acute Toxicity of Ammonia, Copper, and Pesticides to Key Copepods, *Pseudodiaptomus forbesi* and *Eurytemora affinis*, of the San Francisco Estuary", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

[5] Werner, I, "Effects of Ammonia/um and Other Wastewater Effluent Associated Contaminants on Delta Smelt", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

Inhibition of Diatom Primary Production. – In the Delta, low primary production rates and standing chlorophyll levels may be one factor contributing to the POD including the decline in diatom populations[1]. The causes of low primary production are not understood. Some areas with low primary production are not influenced by the discharger. Dr. Richard Dugdale from the San Francisco State University Romberg Tiburon Center presented evidence that an ammonia concentration greater than 0.056 mg N/l inhibited nitrate uptake by diatoms in Suisun Bay[2]. Ammonia-induced inhibition of nitrate uptake prevents spring algal blooms from developing when conditions are otherwise favorable[3]. High diatom filtration rates by the introduced clam *Corbula* and high turbidity levels are additional factors responsible for reducing diatom production and standing biomass in Suisun Bay. A combination of the above three factors (ammonia inhibition of nitrate uptake, depletion due to filtration by clams, and high turbidity levels due to standing chlorophyll) may contribute to the low diatom abundance now present in the Bay.

The San Francisco Regional Water Quality Control Board is responsible for conducting regulatory activities of water quality in Suisun Bay (part of the Delta system). The Executive Officer from the San Francisco Water Board has informed staff from the Central Valley Water Board that ammonia levels in Suisun Bay may be impairing the aquatic life beneficial uses in Suisun Bay by having a detrimental effect on primary production and phytoplankton species composition[4]. Staff from the San Francisco Regional Board monitored ammonia concentrations and algal species composition in Suisun Bay in the spring of 2010 to determine ammonia concentrations and the response of the diatom community. A written report is soon.

Nutrient monitoring by Central Valley Water Board staff have confirmed that the Central Valley watershed is an ammonia source to Suisun Bay[8]. Annual average ammonia concentrations increased 11.5-fold in the Sacramento River downstream of the SRWTP. More than three quarters of this ammonia (NH_3) is nitrified to nitrite (NO_2) and nitrate (NO_3) before the water reaches Chipps Island 40 miles downstream of SRWTP. The channel off Chipps Island is considered here to be the entrance to Suisun Bay. Total dissolved nitrogen (TDN) concentrations (NH_3+NO_2+NO_3) were constant between the SRWTP and Chipps Island. A stable concentration of TDN implies that there are no additional large sources or sinks of nitrogen in the Sacramento River channel between the SRWTP and Suisun Bay. The annual average ammonia concentration at Chipps Island was 0.1 mg N/l in 2009 and 2010[3]. The Dr. Richard Dugdale laboratory reports that ammonia begins to suppress nitrate assimilation in Suisun Bay at about 0.014 mg N/l with a complete shutdown at 0.056 mg-N/l[10].

Recent studies by the Dugdale laboratory at the Romberg Tiburon Center demonstrate that ammonia concentrations are suppressing nitrogen uptake and algal primary production in both

[1] Sommer, T., C. Armor, R. Baxter, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K. Souza. 2007. The collapse of pelagic fishes in the upper San Franisco Estuary. Fisheries 32(6):270-277.
[2] Dugdale, R. f. Wilkerson, V. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring bloom development in San Francisco Bay. Estuarine, Coastal and Shelf Science, 73:17-29
[3] Wilkerson, F. R. Dugdale, V. Hogue, and A. Marchi, 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. Estuaries and Coasts 29(3):401-416.
[4] June 4, 2010 letter from Mr. Bruce Wolfe, Region 2 to Ms. Kathy Harder, CVWQCB.

Suisun Bay and the Delta[1]. The San Francisco Regional Water Quality Control Board is responsible for regulating water quality in Suisun Bay. The Executive Officer from the San Francisco Water Board has informed staff from the Central Valley Water Board that ammonia levels in Suisun Bay may be impairing aquatic life beneficial uses by having a detrimental effect on primary production and algal species composition and request that the Central Valley Regional Board take all reasonable and feasible measures to reduce ammonia loads as soon as possible[2]. Evidence for ammonia impairment of algal primary production in the Delta was reported for the first time at the 6th Biennial Bay-Delta Science Conference by Dr Parker[3]. Dr Parker stated that "*a U-shaped pattern of primary production and chlorophyll was observed ...with a maximum in the river above the SRWTP and again to the west in San Pablo Bay, essentially a mirror image of the distribution of ammonia concentrations*". These results are consistent with the earlier observations for Suisun Bay that ammonia concentrations suppress algal primary production and standing chlorophyll levels and extend the findings to the freshwater Delta. Dr. Dugdale's laboratory report that ammonia begins to suppress nitrate assimilation and primary production rates at 0.014 mg-N/l with complete shutdown by 0.056 mg-N/l[4]. Regional Board staff monitored ammonia concentrations monthly at Chipps Island, about 2 miles upstream of Suisun Bay, and at multiple locations in the Delta for a year between March 2009 and February 2010[2]. Ambient ammonia concentrations in 2009 and 2010 would need to be reduced by a factor of 2 to 7 at Chipps Island and by a factor of 1 to 21 in the main channel of the Sacramento River between Rio Vista and Chipps Island to eliminate the suppression of nitrogen uptake and primary production (See Table J-2). For comparison, the proposed ammonia permit limits would reduce the maximum daily concentration 20-fold (45[4] to 2.2 mg N/L) and the average monthly value 13-fold (24[5] to 1.8 mg N/L). These values are comparable to the decreases needed for the Delta and for Suisun Bay to eliminate the ammonia impairment of nitrogen uptake and primary production by the phytoplankton community.

Ammonia concentrations are higher in the Sacramento River downstream of the SRWTP than in Suisun Bay. Two studies have been undertaken to determine the effect of ammonia on phytoplankton primary production in the Sacramento River and Delta. Both studies have found that ambient ammonia concentrations reduce nitrate uptake[6]. An additional complicating factor is that chlorophyll a concentrations decrease as the Sacramento River flows toward the Delta. The decrease in chlorophyll appears to commence above the SRWTP. The average

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[1] Wilkerson, F. R. Dugdale, V. Hogue, and A. Marchi, 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. Estuaries and Coasts 29(3):401-416.
Dugdale, R. f. Wilkerson, V. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring bloom development in San Francisco Bay. Estuarine, Coastal and Shelf Science, 73:17-29
Machi, A. 2010. Spring 2010 Phytoplankton Blooms in Northern San Francisco Estuary: Influences of Climate and Nutrients. Presented at the 6th Biennial Bay-Delta Science Conference held in Sacramento California on 27-29 September 2010.

[2] June 4, 2010 letter from Mr. Bruce Wolfe to Ms. Kathy Harder

[3] A. Parker, R. Dugdale, F. Wilkerson, A. Marchi, 2010. Biogeochemical Processing of Anthropogenic Ammonium in the Sacramento River and the northern San Francisco Estuary: Consequences for Pelagic Organism Decline Species. Presented at the 6th Biennial Bay-Delta Science Conference held in Sacramento California on 27-29 September 2010

[4] 5-year daily maximum value.

[5] 5-year monthly average value

[6] Parker, A., R. Dugdale, and F. Wilkerson. 2010. Biochemical processing of anthropogenic ammonium in river and estuarine water columns.

annual decline in pigment between Tower Bridge in the City of Sacramento and Isleton is about 60 percent. The cause of the decline is not known, but has been variously attributed to algal settling, toxicity from an unknown chemical in the SRWTP effluent, or from ammonia. The SRWTP discharge cannot be cause of pigment decline upstream of the discharge point, and may not be contributing to the decline downstream of the discharge point.

Table J-2 SUMMARY OF REPORTED AMMONIA EFFECT CONCENTRATIONS AND THE ASSOCIATED AMMONIA EXCEEDANCE FACTORS FOR VARIOUS LOCATIONS IN THE SACRAMENTO-SAN JOAQUIN RIVER DELTA.

Organism	Location	NH_3 Effect (mg N/L)	Ambient NH_3 (mg N/L)[1]		Exceedance Factor[2]		Reference
			Max	Mean	Max	Mean	
Pseudodiaptomus forbesi	Sacramento R @ Hood	Reduce Reproduction and Nauplii survival[3]	0.71	0.46	2X	1.3X	Dr Swee Teh
Diatoms	Sacramento R @ Chipps Is	Reduces nitrate uptake[4]	0.16	0.10	11X	7X	Dugdale *et al.*, 2007; Wilkerson *et al.*, 2006
		Shutdown nitrate uptake[5]	0.16	0.10	3X	2X	
Diatoms	Sacramento R between RioVista & Pt Sacramento	Reduces nitrate uptake[4]	0.01-0.32	0.08-0.19	1-21X	5X-13X	
		Shutdown nitrate uptake[5]	0.01-0.32	0.08-0.19	1-6X	1-3X	

[1] The maximum and mean ambient ammonia concentration is the highest monthly and annual average value measured at the site between March 2009 and February 2010 by Regional Board staff (Foe *et al.*, 2010)
[2] Calculated by dividing the measured ambient ammonia concentration by the reported effect level
[3] 0.36 mg N/l
[4] 0.015 mg N/l
[5] 0.056 mg N/l

<u>Shift in Algal Communities</u>. - Dugdale *et al* hypothesize that larger algal cells (diatoms) are favored and grow faster in the nitrate-dominated river above the SRWTP while smaller phytoplankton species (flagellates and bluegreen algae) are competitively superior and grow faster at the higher ammonia levels present downstream of the SRWTP[1]. A higher growth rate should cause the smaller sized cells to gradually replace any diatom-dominated community downstream of the SRWTP.

In addition, Dr. Patricia Glibert hypothesizes that a change in ambient nitrogen to phosphorus ratios and in the oxidation state of the nitrogen species can also alter algal species composition[2]. According to Dr. Glibert, ambient nitrogen to phosphorus ratios in the Delta now favors blue-green algae and flagellates.

Dr. Peggy Lehman and T. Brown have documented that the algal community in the Delta has changed from a diatom to a flagellate/blue-green algal dominated community consistent with

[1] Ib.
[2] P. Glibert, 2010. Long-term changes in nutrient loading and stoichiometry and their relationships with change in the food web and dominant pelagic fish species in the San Francisco Estuary, California. Review in Fisheries Science (accepted).

the predictions of Dugdale *et al.* and Glibert[1]. Whether this is the result of changes in nutrient concentrations and/or ratio is not known. Diatoms are assumed to be more nutritious to primary consumers like zooplankton than flagellates and bluegreen algae. Changes in algal food availability and its quality or a "bottom up" effect is one factor hypothesized to contribute to the POD[9]. Follow up studies are needed to determine the ecological effect of the change in nutrient concentrations and ratios on the phytoplankton community and whether nutrient control might cause the community to revert back to a diatom-based system.

Dissolved Oxygen - The Basin Plan includes a water quality objective for dissolved oxygen of not less than 7.0 mg/L at any time for portions of the Delta, including the Sacramento River in the vicinity and downstream of the SRWTP discharge. Oxygen demanding substances, including carbon and nitrogen compounds, present in receiving waters are oxidized by microorganisms (bacteria and algae) resulting in the consumption of oxygen from the water column. If sufficient quantities of oxygen demanding substances are present in the water column, the rate of oxygen consumption may be greater than the reaeration of oxygen from the atmosphere and the dissolved oxygen levels drop in the water column. As the oxygen demanding compounds are oxidized and their concentrations are reduced, the rate of oxygen consumption falls and the reaeration acts to increase the dissolved oxygen levels in the water column. Because the typical response of the dissolved oxygen downstream from a discharge containing oxygen-demanding substances is to first decrease and then increase some distance downstream, the dissolved oxygen plot forms a characteristic "sag" curve.

The SRWTP discharges oxygen demanding substances, including biochemical oxygen demand (BOD) and ammonia. Current SRWTP BOD concentrations average 7.5 mg/L and the average effluent ammonia is 24 mg/L (as Nitrogen). The Discharger evaluated and modeled the dissolved oxygen demand from its discharge and reported the results in the "Low Dissolved Oxygen Prevention Assessment", May 2010. The analysis was based on the Streeter-Phelps Oxygen Sag Curve equation and includes oxygen depletion of carbonaceous oxygen demanding compounds and ammonia present in the water column. Additionally, the decay of organic nitrogen into ammonia is included in an expanded Streeter-Phelps model. The low dissolved oxygen prevention assessment (LDOPA)[2] model calculates daily averaged dissolved oxygen in the Sacramento River from the discharge of the SRWTP at Freeport, to the confluence of the Sacramento and San Joaquin Rivers (the Delta). The model uses river flow rate and temperatures input data developed for the Discharger's SRCSD DYNTOX model (SRCSD 2009) providing a 70-year period of record as a basis for the model simulations. The LDOPA model uses 7.0 mg/L, the Basin Plan water quality objective as the target to be achieved and calculates the maximum Ultimate Oxygen Demand (UOD) that can be

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[1] Lehman, P. 1998. Phytoplankton species composition, size structure, and biomass and their possible effect on copepod food availability in the low salinity zone of the San Francisco Bay/Delta and Suisun Bay. IEP technical report No. 62. August 1998.
Lehman, P. 2000A The influence of climate on phytoplankton community biomass in San Francisco Bay Estuary. Limn and Ocean 45(3):580-590
Lehman, P. 2000B. Phtyoplankton biomass, cell diameter, and species composition in the low salinity zone of northern San Francisco Bay Estuary. Estuaries 23 (2):216-230.
Brown, T. 2010. Phytoplankton community comoposition: the rise of the flagellates. IEP Newsletter.

[2] More detailed information can be found in "Low Dissolved Oxygen Prevention Assessment", Larry Walker Associates, May 2010

discharged. The UOD is made of the combination of the primary oxygen demand substances in the effluent, BOD and ammonia.

The model was run for both 181 mgd (current design flow) and 218 mgd (previously proposed future flow). The model predicts the bottom of the dissolved oxygen curve is between Rio Vista and Emmaton (about 35 miles downstream of the discharge point) and the beneficial use impacts from the Discharger are felt nearly 40 miles downstream. However, data collected for the Central Valley's Nutrient report showed the lowest dissolved reading at Hood (8 miles downstream) and Isleton (25 miles downstream). The Discharger will need to reduce oxygen demanding constituents in order to comply with the Basin Plan water quality objective. The LDOPA model showed a seasonal difference in the dissolved oxygen assessment because temperature and flow velocity are important factors in the rate of decay of oxygen. The Discharger proposes seasonal limits and the use of UOD in terms of pounds per day as the permit limit. The LDOPA model calculated the maximum UOD before the Basin Plan objective of 7.0 mg/L is exceeded. Based on a design flow of 181 mgd with a 99.9885% compliance (that is, compliance for all but one hour per year) the UOD would be as follows:

		Dry Season UOD (lbs/day)		Wet Season UOD (lbs/day)	
Flow (Q_{eff})	Percent Compliance (%)	AMEL	MDEL	AMEL	MDEL
181 mgd	99.9885	169,000	234,000	275,000	438,000

Ultimate Oxygen Demand = $8.34x[1.5(BOD_5)+4.6(Ammonia)]xQ_{eff}$

In addition to the UOD, BOD limits would be technology based limits for secondary treatment and ammonia limits would be based on the DYNTOX modeled mixing zones for acute and chronic toxicity and are as follows:

		Effluent Limitations		
Parameter	Units	Average Monthly	Average Weekly	Maximum Daily
BOD	mg/L	30	45	60
Ammonia[1]	mg/L as N	37	----	47

[1] Based on acute mixing zone of 60 feet & chronic mixing zone of 350 feet as evaluated with DYNTOX dynamic model

The LDOPA model is based on limited ambient dissolved oxygen sampling conducted by the Discharger. The Discharger's 2009 ambient dissolved data at Hood did not show the dissolved oxygen concentrations less than the water quality objective of 7.0 mg/L 8 miles downstream of the discharge, at Hood. However, the Municipal Water Quality Investigations (MWQI) unit from the Department of Water Resources (DWR), the California Data Exchange Center (CDEC) managed by DWR, the Central Valley Water Board, and the City of Rio Vista have all collected dissolved oxygen data that shows at times, the dissolved oxygen concentration below 7.0 mg/L at various locations on the Sacramento River between the discharge point at Freeport and Rio Vista, 40 miles downstream. Because of this discrepancy in data, the Discharger expanded its monitoring from April to June 2010 for dissolved oxygen under rigorous quality assurance and quality control (QA/QC). Again none of the Discharger's collected dissolved oxygen concentrations dropped below 7.0 mg/L and compared with the continuous dissolved oxygen monitoring data collected by DWR at Hood, the Discharger's data shows an upward bias in the data, that is, the Discharger's data generally reports higher dissolved oxygen concentrations than data from other sources. At Central Valley Water Board staff's request, DWR checked their data collected at Hood from June 2008 through December 2009, for quality assurance and control and found in many instances the dissolved oxygen concentrations at Hood were below 7.0 mg/L.

The treatment processes or source control are required to reduce Dry Season ammonia and will be in place, therefore, Central Valley Water Board staff believes the Wet Season ammonia should be reduced by the same amount as the Dry Season. The Discharger did not offer compelling arguments to not reducing wet season ammonia limits. Therefore, Discharger's request for seasonal UOD requirements is not included in the permit.

Since conflicting data exist for dissolved oxygen concentrations in the Sacramento River, the Central Valley Water Board concluded that to protect beneficial uses it must be assumed that the River at times, is less than the water quality objective of 7.0 mg/L and the Discharger is currently using all the assimilative capacity in the Sacramento River from Freeport to Rio Vista for oxygen demanding constituents. This results in no assimilative capacity for any other cities and communities to discharge oxygen demanding constituents which is needed for them to grow. In contrast to the Discharger, most of the other cities and communities are implementing Best Practicable Treatment or Control (BPTC) for their own facilities. The following communities have either constructed BPTC processes, will construct BPTC processes, or construct infrastructure to regionalize to BPTC facilities and would be affected by the lack of assimilative capacity for oxygen demanding constituents:

City of Roseville	City of Davis
City of Woodland	Community of El Dorado Hills
City of Placerville	City of Manteca
City of Stockton	City of Lodi
City of Galt	Community of Ironhouse
City of Tracy	City of Lincoln
City of Yuba City	Community of Olivehurst/Marysville
City of Live Oak	City of Auburn
City of Colfax	City of Vacaville
Community of North Auburn	Community of Granite Bay

Nitrosodimethylamines (NDMA) - Nitrosamines, mainly N-nitrosodimethylamine (NDMA), N-nitrosomethylethylamine (NMEA) and N-nitrosodiethylamine (NDEA) are highly mutagenic compounds that are suspected of carcinogenic activity to the human body.[1] NDMA is formed as a disinfection by-product from wastewater containing ammonia and/or nitrogen and chlorination. Historically, NDMA was used to make rocket fuel until contamination was found

[1] Abdrzejewski, P. "N-Nitrosomethlyethylammine (NMEA) and N-Nitrosodiethylamine (NDEA), Two New Potential Disinfection Byproducts; Formation During Water Disinfection with Chlorine", Global NEST Journal, Vol. 7, No 1, pp 17-26, 2005.

in air, soil and water. NDMA is produced currently only a research chemical. Laboratory detection levels for NDMA are greater than the water quality criteria and can range from 0.002 µg/L to 30 µg/L. From June 2005 to July 2008, 15 percent of effluent samples detected NDMA at levels greater than the water criterion with the maximum concentration over 100 times the primary MCL. The detection levels for sampling effluent are often too high to detect low concentrations of NDMA, therefore, this detection percentage may be underestimated. Similarly, the receiving water showed no detectable concentrations for NDMA, but the detection limits are too high to detect low concentrations. The California Department of Water Resources (DWR) is currently studying NDMA in the Sacramento-San Joaquin Delta. Preliminary data shows NDMA has not been detected at Hood, eight miles downstream of the discharge on the Sacramento River. However, DWR did find the NDMA precursors significantly greater (3-4 times) below the discharge compared with above the discharge[1] point.

Formation of NMEA and NDEA is a result of the reaction of methylethylamine (MEA) or diethylamine (DEA) respectively with chlorine in the presence of ammonia ions[2]. New studies indicate that NMEA and NDEA are also disinfection byproducts from treatment of wastewater and thus need to be monitored in the Monitoring and Reporting Program. Because the laboratory analysis EPA Method 521 identifies all three nitrosoamines, no additional costs are incurred with monitoring for NMEA and NDEA.

<u>Best Practical Treatment and Control</u> – In order to reduce or eliminate ammonia and nitrogen from its effluent, nitrification and denitrification treatment processes are required. According to the "Technical Memorandum: Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant", May 2010, the capitol costs to nitrify and denitrify would be approximately $3.0 million/mgd or for the 181 mgd WWTP a cost of $760 million if a 1.4 maximum average month peaking factor is used.

State Water Resources Control Board Resolution No. 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California" requires:

"Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges of proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

Best Practical Treatment and Control (BPTC) is not defined in Resolution No. 68-16. However, in its "Questions and Answers" for Resolution No. 68-16, BPTC is interpreted as

[1] "Investigation into the sources of nitrosamines and their precursors in the Sacramento-San Joaquin Delta, California", Carol L DiGiorgio, California Department of Water Resources, Municipal Water Quality Investigations Unit. Poster presented from 9-11 August 2009.

[2] Abdrzejewski, P. "N-Nitrosomethlyethylammine (NMEA) and N-Nitrosodiethylamine (NDEA), Two New Potential Disinfection Byproducts; Formation During Water Disinfection with Chlorine", Global NEST Journal, Vol. 7, No 1, pp 17-26, 2005.

"best efforts" In State Water Board Order WQ 2000-07, the Board stated the "one factor to be considered in determining best practicable treatment and control would be the water quality achieved by other similarly situated dischargers and the methods used to achieve water quality". The Discharger argues that they are not similar to other dischargers in that the Sacramento River provides adequate dilution to allow their discharge at treatment levels less than the majority of dischargers that discharge to the Delta directly or indirectly (by the tributary rule). However, as described above, the ammonia discharged by the Discharger is impacting beneficial uses of the Sacramento River, Delta and the Suisun Bay. Therefore, BPTC in the form of nitrification and denitrification is required to assure that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.

EXHIBIT B

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

TIME SCHEDULE ORDER NO. R5-2010-0115

REQUIRING THE SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
SACRAMENTO COUNTY
TO COMPLY WITH REQUIREMENTS PRESCRIBED IN ORDER NO. R5-2010-0114
(NPDES PERMIT NO. CA0077682)

The California Regional Water Quality Control Board, Central Valley Region, (hereinafter Central Valley Water Board) finds that:

1. On 9 December 2010, the Central Valley Water Board adopted Waste Discharge Requirements (WDR) Order No. R5-2010-0114, prescribing waste discharge requirements for the Sacramento Regional County Sanitation District (hereinafter Discharger) for the Sacramento Regional Wastewater Treatment Plant (hereafter Facility), in Sacramento County.

2. WDR Order No. R5-2010-0114, contains Final Effluent Limitations IV.A.1, which reads, in part, as follows:

   a. The Discharger shall maintain compliance with the effluent limitations specified in Table 6:

Table 6. Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Max Daily	Instantaneous Minimum	Instantaneous Maximum
N-nitrosodimethylamine	ng/L	0.69	--	1.4	--	--
Dibenzo(a,h)anthracene	µg/L	0.2	--	0.4	--	--

3. WDR Order No. R5-2010-0114, contains Final Effluent Limitations IV.A.1, which reads, in part, as follows:

   l. **Chlorpyrifos and Diazinon.** Effluent chlorpyrifos and diazinon concentrations shall not exceed the sum of one as defined below:

   i. Average Monthly Effluent Limit

$$S_{AMEL} = \frac{C_{D\text{-}avg}}{0.08} + \frac{C_{C\text{-}avg}}{0.012} \leq 1.0$$

$C_{D\text{-}avg}$ = average monthly diazinon effluent concentration in µg/L

$C_{C\text{-}avg}$ = average monthly chlorpyrifos effluent concentration in µg/L

EXHIBIT B

ii. Maximum Daily Effluent Limit

$$S_{MDEL} = \frac{C_{D\text{-}max}}{0.16} + \frac{C_{C\text{-}max}}{0.025} \leq 1.0$$

$C_{D\text{-}max}$ = maximum daily diazinon effluent concentration in µg/L

$C_{C\text{-}max}$ = maximum daily chlorpyrifos effluent concentration in µg/L

4. The effluent limitations at Discharge Point No. 001 specified in Order No. R5-2010-0114 for N-nitrosodimethylamine and dibenzo(a,h)anthracene are based on implementation of the California Toxics Rule (CTR). The effluent limitations for chlorpyrifos and diazinon are based on water quality objectives contained in the Basin Plan. The effluent limitations for N-nitrosodimethylamine, dibenzo(a,h)anthracene, chlorpyrifos and diazinon are new limitations, which were not prescribed in previous WDR Order No. 5-00-188, adopted by the Central Valley Water Board on 4 August 2000.

5. California Water Code (CWC) section 13300 states: *"Whenever a regional board finds that a discharge of waste is taking place or threatening to take place that violates or will violate requirements prescribed by the regional board, or the state board, or that the waste collection, treatment, or disposal facilities of a discharger are approaching capacity, the board may require the discharger to submit for approval of the board, with such modifications as it may deem necessary, a detailed time schedule of specific actions the discharger shall take in order to correct or prevent a violation of requirements."*

6. The Discharger requests time to conduct further testing to determine whether the detection of dibenzo(a,h)anthracene in the effluent is the result of a one time detection or if dibenzo(a,h)anthracene is a constituent that requires source control. If further testing indicates dibenzo(a,h)anthracene is a consistent constituent of concern, the Discharger requests time to conduct source investigations and evaluate potential source controls that would achieve compliance with the final limits.

7. The Discharger requests time to conduct further testing to determine whether assimilative capacity exists in the ambient water for N-nitrosodimethylamine. The detection level of N-nitrosodimethylamine is substantially greater than the water quality objective. All the ambient water samples were non-detect, thus, with the detection level greater than the water quality objective, no assimilative capacity is available as required in the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). However, even with assimilative capacity, the Discharger may not be able to meet the final effluent limits. Thus, the Discharger must either reduce N-nitrosodimethylamine by source control or change operations or change treatment process for disinfection by chlorine to another disinfection method. The Discharger requests time to conduct source investigations and evaluate potential source controls that would achieve compliance with the final limits.

8. In accordance with CWC section 13385(j)(3), the Central Valley Water Board finds that, based upon results of effluent monitoring, the Discharger is not able to consistently comply with the new water quality-based effluent limitation for N-nitrosodimethylamine, dibenzo(a,h)anthracene, chlorpyrifos and diazinon. These limitations are new requirements that become applicable to WDR Order No. R5-2010-0114 after the effective date of adoption of the waste discharge requirement for which new or modified control measures are necessary in order to comply with the limitations, and the new or modified control measures cannot be designed, installed, and put into operation within 30 calendar days.

9. Immediate compliance with the new effluent limitations for N-nitrosodimethylamine, dibenzo(a,h)anthracene, chlorpyrifos and diazinon is not possible or practicable. The Clean Water Act and the California Water Code authorize time schedules for achieving compliance.

Mandatory Minimum Penalties

10. CWC section 13385(h) and (i) require the Central Valley Water Board to impose mandatory minimum penalties upon dischargers that violate certain effluent limitations. CWC section 13385(j) exempts certain violations from the mandatory minimum penalties. CWC section 13385(j)(3) exempts the discharge from mandatory minimum penalties "*where the waste discharge is in compliance with either a cease and desist order issued pursuant to Section 13301 or a time schedule order issued pursuant to Section 13300, if all the [specified] requirements are met... For the purposes of this subdivision, the time schedule may not exceed five years in length...*"

11. By statute, in accordance with CWC section 13385(j)(3)(C), a Time Schedule Order may provide protection from MMPs for no more than five years. Compliance with this Order only exempts the Discharger from mandatory penalties for violations of the final effluent limitations for N-nitrosodimethylamine, dibenzo(a,h)anthracene, chlorpyrifos and diazinon in accordance with CWC section 13385(j)(3). Protection from MMPs for the final effluent limitations for N-nitrosodimethylamine, dibenzo(a,h)anthracene, chlorpyrifos and diazinon begins immediately, and may not extend beyond 1 December 2015.

12. CWC section 13385(j)(3) requires the Discharger to submit and implement its pollution prevention plans for N-nitrosodimethylamine, dibenzo(a,h)anthracene, chlorpyrifos and diazinon pursuant to section 13263.3 of the California Water Code.

13. Since the time schedule for completion of action necessary to bring the waste discharge into compliance exceeds 1 year, this Order includes an interim requirement and date for achievement. The time schedule does not exceed five years.

    The compliance time schedule in this Order includes interim maximum daily effluent limitations for N-nitrosodimethylamine, dibenzo(a,h)anthracene, and chlorpyrifos. The data set are based on data collected between 12 June 2005 and 10 October 2009. All the data collected for N-nitrosodimethylamine dibenzo(a,h)anthracene, and chlorpyrifos had less than 20 percent detection. When at least 80% of the data points are reported as non detected values, interim limitations are based on 3.11 times the maximum observed effluent concentration (MEC) to obtain the daily maximum interim limitation. The following table summarizes the calculations of the daily maximum interim effluent limitation for these constituents:

Parameter	Units	MEC	Mean (x)	Std. Dev. (sd)	Formula Used	Interim Limitation Maximum Daily
N-nitrosodimethylamine	ng/L	0.082	--	--	3.11*MEC	0.26
Dibenzo(a,h)antracene	µg/L	0.51	--	--	3.11*MEC	1.6
Chlorpyrifos	µg/L	0.039	--	--	3.11*MEC	0.12

14. The Central Valley Water Board finds that the Discharger can maintain compliance with the interim limitations included in this Order. Interim limitations are established when compliance with the final effluent limitations cannot be achieved by the existing discharge. Discharge of constituents in concentrations in excess of the final effluent limitations, but in compliance with the interim effluent limitations, can significantly degrade water quality and adversely affect the beneficial uses of the receiving stream on a long-term basis. The interim limitations, however, establish an enforceable ceiling concentration until compliance with the effluent limitation can be achieved. The Central Valley Water Board finds that the time schedule contained herein is as short as possible, taking into account the technological, operational, and economic factors that affect the design, development, and implementation of control measures that are necessary to comply with the final effluent limitations.

Other Regulatory Requirements

15. On 9 December 2010, in Rancho Cordova, California, after due notice to the Discharger and all other affected persons, the Central Valley Water Board conducted a public hearing at which evidence was received to consider a Time Schedule Order under CWC section 13300 to establish a time schedule to achieve compliance with waste discharge requirements.

16. Issuance of this Order is exempt from the provisions of the California Environmental Quality Act (Public Resources Code section 21000, et seq.), in accordance with CWC section 15321 (a)(2), Title 14, of the California Code of Regulations.

IT IS HEREBY ORDERED THAT:

1. The Discharger shall comply with the following time schedule to ensure compliance with the final effluent limitations for N-nitrosodimethylamine, dibenzo(a,h)anthracene, chlorpyrifos and diazinon contained in WDR Order No. R5-2010-0114 as described in the above Findings:

Task	Date Due
Submit Method of Compliance Workplan/Schedule.	**Within 6 months of adoption of this Order**
Submit and implement an updated, or new as appropriate, Pollution Prevention Plan (PPP) pursuant to CWC section 13263.3.	**Within 6 months of adoption of this Order**
Annual Progress Reports[1]	**1 December, annually**, after approval of workplan until final compliance
Full compliance with the final effluent limitations for N-nitrosodimethylamine and dibenzo(a,h)anthracene.	**1 December 2015**
Full compliance with the final effluent limitations for chlorpyrifos and diazinon.	**1 December 2015**

[1] The progress reports shall detail what steps have been implemented towards achieving compliance with waste discharge requirements, including studies, construction progress, evaluation of measures implemented, and recommendations for additional measures as necessary to achieve full compliance by the final date.

2. The following interim effluent limitations shall be effective immediately and until the date specified in the table for applicable parameter, or when the Discharger is able to come into compliance, whichever is sooner.

Effective Immediately and Until:	Parameter	Maximum Daily Effluent Limitation (µg/L)
1 December 2015	N-nitrosodimethylamine (ng/L)	0.26
1 December 2015	Dibenzo(a,h)antracene (µg/L)	1.6
1 December 2015	Chlorpyrifos (µg/L)	0.12

3. For the compliance schedule required by this Order, the Discharger shall submit to the Central Valley Water Board on or before the compliance report due date, the specified document or, if appropriate, a written report detailing compliance or noncompliance with the specific schedule date and task. If noncompliance is being reported, the reasons for such noncompliance shall be stated, and shall include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Central Valley Water Board by letter when it returns to compliance with the time schedule.

4. If, in the opinion of the Executive Officer, the Discharger fails to comply with the provisions of this Order, the Executive Officer may apply to the Attorney General for judicial enforcement or may issue an Administrative Civil Liability Complaint pursuant to CWC section 13323.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Resource Control Board (State Water Board) to review the action in accordance with CWC section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday (including mandatory furlough days), the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 9 December 2010.

Original Signed By

PAMELA C CREEDON, Executive Officer

EXHIBIT C

SOMACH SIMMONS & DUNN
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
500 CAPITOL MALL, SUITE 1000, SACRAMENTO, CA 95814
OFFICE: 916-446-7979 FAX: 916-446-8199
SOMACHLAW.COM

MEMORANDUM

TO: David Coupe, Senior Staff Counsel
Central Valley Regional Water Quality Control Board

FROM: Paul S. Simmons
Theresa A. Dunham

DATE: December 9, 2010

SUBJECT: Sacramento Regional County Sanitation District Comments and Evidence Provided to Central Valley Regional Water Quality Control Board (Central Valley Water Board) and Lack of Response to Certain Comments

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As you know, our firm represents the Sacramento Regional County Sanitation District (SRCSD or District) in the matter concerning the Central Valley Water Board's renewal of Waste Discharge Requirements (NPDES No. CA0077682) for the Sacramento Regional Wastewater Treatment Plant (SRWTP) (Tentative Permit). On October 11, 2010, the District submitted extensive comments and evidence in response to the September 2010 Tentative Permit released by the Central Valley Water Board. Recently, staff of the Central Valley Water Board released its *Response to Written Comments for Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant Tentative Waste Discharge Requirements* (Response to Comments). Having reviewed the Response to Comments, we find it necessary to alert you of our concern with respect to the lack of response to significant certain comments and evidence submitted by the District.

The Code of Federal Regulations requires the Response to Comments to "[b]riefly describe and respond to all significant comments on the draft permit . . . raised during the public comment period or during any hearing." (40 C.F.R. § 124.17(a)(2).) In many instances we may not agree with a given response, or may consider certain responses insufficient. But for the significant comments identified below, the Response to Comments fails to include any response whatsoever. Thus, the Response to Comments fails to satisfy federal regulatory requirements.

<u>SRCSD Comments, page 11:</u>

> . . . *Giardia* is much more susceptible to inactivation by free chlorine and chloramines . . . in the SRWTP effluent before discharge. Using an analysis with assumptions more realistic than the conservative assumptions in the Estimated Risk Report, the Sacramento River downstream of the SRWTP outfall would

EXHIBIT C

definitely approach, and may achieve, the 1:10,000 risk level recommended by DPH. Dr. Gerba provides further analysis and conclusions in accompanying material, which constitutes additional comment and evidence.

SRCSD Comments, pages 13-15:[1]

> . . . [T]he Regional Board could not adopt the proposed limitations without compliance with Water Code section 13262(a), which requires consideration of beneficial uses to be protected, water quality objectives reasonably required for that purpose, other waste discharges, and the provisions of section 13241 of the Water Code . . . . Implementing full Title 22 tertiary treatment at SRWTP would significantly reduce the incentive and ability to recycle water, by diverting potential resources away from recycled water projects to a major filtration and disinfection treatment project. To the extent recycled water uses require tertiary effluent, the demand can be met by sizing facilities (or, potentially, constructing satellite or scalping facilities) to meet the demand. Demand for recycled water only equates to a fraction of SRWTP flow. Expensive, advanced treatment for the entire flow requires allocation of additional funds that do not serve projected recycled water needs. Thus, requiring full tertiary treatment at the SRWTP would act as a substantial economic disincentive to the development and use of recycled water by the District and would hinder rather than facilitate the development of recycled water in the Sacramento region.

SRCSD Comment, pages 29-30:

- Attachment K implies that *Microcystis* is a "less desirable form" of algae that may be associated with ammonia from the SRWTP. However, available research from the Delta —which is not referenced in the Tentative Permit— argues against a simplistic association between *Microcystis* and nutrient form or concentration. Studies conducted by Lehman et al. (2008, 2010) and Mioni (2010) in the Delta have found no apparent association between ammonium concentrations or NH_4^+:P ratios and either *Microcystis* abundance or toxicity. Instead, it appears from these studies that water temperature is strongly positively correlated with *Microcystis* abundance and toxicity and that water transparency, flows, and specific conductivity are also potential drivers of *Microcystis* blooms in the Delta. An association between water temperature and *Microcystis* blooms in the Delta is supported by the upward trend in spring-summer mean water temperature in the freshwater Delta between

[1] The Response to Comments identifies SRCSD's comment with respect to the lack of Water Code section 13241 findings and proposes to amend the tentative permit by adding in template findings found in other permits. However, the inclusion of the findings in Response to SRCSD Comment #1 fails to actually address specific comments provided by SRCSD specific to the individual factors under Water Code section 13241.

> 1996-2005 (Jassby (2008)) and would be consistent with observations from other estuaries, where increased residence time (e.g., during drought) and warmer temperatures are acknowledged as factors stimulating cyanobacterial blooms (Pearl et al. (2009), Pearl & Huisman (2008), Fernald et al. (2007)).

<u>SRCSD Comments, page 37</u>:

> When environmentally representative pH is considered, test results using *E. affinis* do not indicate a potential for acute toxicity in the Sacramento River or the Delta. Acute tests with *E. affinis* referenced in the Teh et al. (2009) oral presentation were described as Appendix A in a progress report for the UC Davis POD project (Reece et al. (2009)) and again as chapter IV.3 in Werner et al. (2010). The LC10 for *E. affinis* obtained at the most environmentally relevant test pH used (pH 7.6) was 5.0 mg N/L total ammonia. This concentration (5.0 mg N/L) is about five times higher than the maximum concentrations observed in the Sacramento River from RM-44 and points downstream. This LC10 is higher than the 99.91-% percentile of ammonia concentrations occurring 350 feet below the SRWTP diffuser. *In other words, ambient concentrations of total ammonia in the Sacramento River essentially never exceed the lowest acute thresholds (LC10) thus far reported for E. affinis for representative pH conditions.* The lack of reasonable potential for acute toxicity for *E. affinis* for the rest of the Delta is reflected by long-term monitoring data; in terms of *un-ionized* ammonia, the LC10 for representative pH 7.6 (0.08 mg N/L un-ionized ammonia) is well above the 99th percentile for freshwater concentrations of un-ionized ammonia in the freshwater Delta for 2000-2010 (0.014 mg N/L un-ionized ammonia, Engle Testimony (2010)).

<u>SRCSD Comments, page 41</u>:

> Attachment K provides no evidence or explanation as to why reduction in wet season ammonia is necessary to ensure compliance with the dissolved oxygen Basin Plan objective. Further, Attachment K fails to provide any proper justification as to why UOD limits are not a proper method for controlling loading of oxygen demanding substances in the Sacramento River and the Delta. The District's proposal, however, would ensure compliance with the 7.0 mg/L dissolved oxygen Basin Plan objective throughout the year, and would trigger the need for the District to reduce oxygen demanding substances in SRWTP effluent accordingly. (LDOPA at pp. 21-23.)

SRCSD Comments, pages 42-43:

> Attachment K also attempts to find that the oxygen demanding substances in the SRWTP discharge "... results in no assimilative capacity for any other cities and communities to discharge oxygen demanding constituents which is needed for them to grow," and therefore full nitrification is appropriate. However, the argument here is misplaced for several reasons. Attachment A includes a list of 20 different POTWs that discharge to waterways in the greater Sacramento region and beyond. Attachment K states that these facilities either already implement or are in the process of implementing BPTC treatment processes (assuming that full nitrification and denitrification is BPTC), and that such facilities may be affected by the lack of assimilative capacity. (Tentative Permit at p. K-9.) Regardless of whether such facilities are building, or have already built treatment facilities that nitrify effluent, such a statement is irrelevant. Further, it is not true that the communities identified "would be affected by the lack of assimilative capacity for oxygen demanding substances" due to the oxygen demanding substances contained in SRWTP effluent. For example, with respect to ten of the entities listed (Roseville, Placerville, Yuba City, Live Oak, Colfax, Lincoln, Olivehurst/Marysville, Auburn, North Auburn, and Granite Bay), these facilities discharge treated effluent to receiving waters tributary to the Sacramento River upstream of the SRWTP discharge. Dissolved oxygen concentrations in the Sacramento River above the SRWTP discharge are of sufficient concentration to provide some level of assimilative capacity for oxygen demanding substances contributed by upstream dischargers and still remain above the 7.0 mg/L Basin Plan objective. The cities of Live Oak, Marysville, Yuba City, Colfax, Auburn, Roseville, Lincoln, and Placerville are all currently discharging treated effluent containing some level of oxygen demanding substances, and do not appear to be causing exceedances of dissolved oxygen concentrations in the Sacramento River below the Basin Plan objective. Further, many of these entities discharge to effluent dominated waterways that are miles from the Sacramento River.
>
> When considering the wastewater treatment facilities that discharge effluent to receiving waters tributary to the Yolo Bypass or Cache Slough (i.e., Davis, Woodland, Vacaville), oxygen demanding substances in their effluents have completely exerted their effects on water column dissolved oxygen concentrations prior to their commingling with Sacramento River water upstream of the city of Rio Vista. Thus, treated effluents from the cities of Woodland, Davis, and Vacaville would be expected to have little if any impact on dissolved oxygen concentrations in the Sacramento River. Finally, with regard to those facilities that discharge their effluent to receiving waters either within or tributary to the Delta downstream of Rio Vista (i.e., Stockton, Galt, Tracy, Manteca, Lodi, El Dorado Hills, and Ironhouse), the District's far-field modeling has shown that SRWTP effluent comprises 0.82 - 3.53% (99.91 percentile at a discharge rate of

181 mgd) of any given volume of water at various locations in the Delta. It is inconceivable that a hypothetical 2% of SRWTP effluent in a volume of water at some location in the Delta would exert such a demand on dissolved oxygen that there would be no assimilative capacity in the receiving water for additional oxygen demanding substances contributed by another discharger. As noted, the District is committed to reducing the UOD load of its effluent to the degree necessary to avoid producing dissolved oxygen concentration excursions below the Basin Plan objective in the Sacramento River downstream of the SRWTP discharge. In this regard, the District's allowed effects on dissolved oxygen levels would be less than allowed under its current permit. However, full nitrification is not necessary, nor is it supportable based on the information.

<u>SRCSD Comments, pages 47-49</u>:

Because NDMA is considered to be a human health criterion, NDMA effluent limits are appropriately established based on concentrations occurring at the edge of the harmonic mean mixing zone.

Although NDMA has not been detected in the receiving water upstream from the SRWTP discharge, no assimilative capacity for NDMA is acknowledged in the Tentative Permit due to the fact that the analytical detection limits are above the CTR criterion. The analytical limitations that prevent determination of the actual ambient level of NDMA in the Sacramento River at Freeport are indirectly used to penalize the District in the consideration of the effects of NDMA on beneficial uses.

Sources of NDMA to surface waters can include release of chlorinated effluent from wastewater treatment plants (Mitch & Sedlak (2002)). As municipal wastewater discharges are the only known source of NDMA to the Sacramento River, the concentration of NDMA upstream of SRWTP discharge would be dependent on NDMA from upstream chlorinated wastewater discharges. Since regionalization of wastewater treatment facilities in the Sacramento region in 1983, all Sacramento County wastewater discharges to the American and Sacramento Rivers were eliminated. The closest major wastewater discharges upstream from Freeport exceeding 5 mgd, which discharge to tributaries of the Sacramento River, are the City of Roseville (Dry Creek and Pleasant Grove plants) and the City of Yuba City. The City of Roseville employs ultraviolet disinfection at its facilities and therefore is not a source of NDMA. The City of Yuba City discharges chlorinated effluent to the Feather River approximately 50 miles upstream from Freeport and realizes significant initial and far-field dilution of its effluent.

A reasonable assessment of the fate of NDMA in natural waters indicates that any upstream contribution of NDMA would be essentially removed by degradation processes. A series of studies sponsored by the WateReuse Foundation found that NDMA removal from groundwater occurs primarily through volatilization and biodegradation (WateReuse Foundation (2006).) Volatilization is a process that occurs in both groundwater and surface water. Further, NDMA is a semivolatile compound with a low boiling point (152 °C) and relatively high vapor pressure (2.67 mm Hg at 25 °C), suggesting a tendency towards volatilization and gas phase transport.

Other studies have shown that photolysis due to exposure to sunlight is another very important factor in reducing NDMA concentrations in surface waters. The half-life of NDMA in surface water exposed to sunlight is approximately 3-24 hours (Kennedy/Jenks/Todd (2008).) This is important in considering the degradation of NDMA that occurs during the travel time of treated effluent from upstream wastewater discharges. For instance, for Yuba City, the travel time to Freeport during critical low flow periods exceeds 3 days, which is adequate time for elimination of NDMA from the river.

Due to NDMA tendencies toward volatilization and photolysis, it is likely that the ambient concentration upstream of SRWTP discharge is zero. With an upstream ambient concentration of NDMA of zero, the blend of SRWTP effluent with Sacramento River water at the edge of its harmonic mean mixing zone would meet CTR criteria, as demonstrated by simple considerations of average effluent NDMA (0.014 μg/l) for the period 2006 to 2010, and the harmonic mean dilution (56:1) that exists in the Sacramento River below Freeport. Based on these values, the calculated ambient NDMA concentration at the edge of the Harmonic Mean Mixing Zone would be 0.00025 μg/l, which is less than the most restrictive CTR criterion (0.00069 μg/l), indicating that NDMA is not likely a significant water quality or human health issue in the Sacramento River below the SRWTP discharge.

<u>SRCSD Comments, page 59</u>:

B. To the Extent the Regional Board Applies Resolution No. 68-16 to Existing Discharges, Such Application Has Not Been Approved Under the Administrative Procedures Act

To the extent that, notwithstanding the inapplicability of the policy to an already-permitted discharge, the Regional Board may assert that it can use the policy here, such assertion is unfounded. It is unlawful to apply or use a policy as a basis of regulation unless the policy has first been proposed, adopted, and approved in accordance with the Administrative Procedures Act (APA). (Gov. Code,

§ 11340.5.) The antidegradation policies have not been adopted to require analysis for an existing discharge, and application for that purpose would require compliance with the APA.

SRCSD Comments, pages 72-74:

a. Bullet Points Are Not a BPTC Analysis

In an effort to claim that the identified levels of treatment constitute BPTC, the Tentative Permit includes a series of bullet points. (Tentative Permit at pp. F-91 - F-92.) However, these statements are not proper findings, and more importantly, they fail to actually support the Tentative Permit's conclusion. These findings also fail to meet "Report on the Antidegradation Analysis" provisions specified in APU 90-004, which states that the antidegradation analysis should be summarized in the fact sheet and include all of the following: water quality parameters and beneficial uses which will be affected by the proposed action and the extent of the impact; scientific rationale for determining the proposed action will or will not lower water quality; description of the alternative measures that were considered; a description of socioeconomic evaluation; and the rationale for determining that the proposed action is or is not justified by socioeconomic considerations. (APU 90-004, at p. 6.) For example, the first four statements in the list of bullet points are merely statements of fact. No one disputes the importance of the Sacramento River and the Sacramento-San Joaquin Delta, or the fact that the Delta is an important environmental and economic resource for the state. However, none of these four statements provide any evidence to suggest that the District's existing discharge is negatively affecting these beneficial uses, or that the proposed treatment requirements are reasonable. Further, the specific values used in these bullet points significantly overstate both the number of people affected and the actual level of impact, if any, to those people.

The next statement, "[a]mmonia, along with BOD, from the SRWTP reduces the dissolved oxygen in the Sacramento River and Sacramento-San Joaquin Delta for nearly 40 miles below its discharge," again is a statement of fact. To the extent that discharges from the SRWTP do reduce dissolved oxygen in the Sacramento River and Delta downstream of the SRWTP discharge, the District proposes to comply with a UOD limit that will ensure future compliance with dissolved oxygen water quality objectives under all projected critical river flow and temperature conditions. By complying with a UOD limit, the District will need to decrease the levels of ammonia and/or BOD in its discharge. However, compliance with UOD limits and ensuring that the receiving water meets dissolved oxygen objectives does not result in the need for full nitrification of effluent from SRWTP. Thus, this statement fails to support full nitrification as being necessary to ensure compliance with dissolved oxygen water quality objectives.

The second sentence of this statement, "[t]he oxygen depleting constituents from the SRWTP use or will use all the assimilative capacity of the River and Delta leaving no assimilative capacity available to other communities that currently reduce oxygen demanding constituents by implementing advanced treatment processes," has no relevance here and is highly misleading. First, the District is not requesting or proposing an increase in discharge, and therefore it does not seek to use additional assimilative capacity beyond what has been permitted previously. Second, the District proposes to comply with a UOD limit that will ensure compliance with applicable dissolved oxygen water quality objectives. Thus, the claim that the District is using assimilative capacity that should be available to others has no bearing on dissolved oxygen levels in the Sacramento River and the Delta. Moreover, this reference is misleading. In the case of other dischargers listed in Attachment K, it is physically impossible for some of the listed discharges to affect dissolved oxygen in the area of interest because their effluents do not reach the lower Sacramento River. Also, none of these entities have ever been regulated based on impacts to dissolved oxygen in this area, and it is unlikely they will be. Further, the District's proposed UOD load limit takes as a given other impacts that occur from other activities in the watershed that impact DO levels downstream of the SRWTP.

Next, the Tentative Permit includes three statements regarding ammonia from the SRWTP and its impact on the Delta: "The ammonia from the SRWTP contributes to the water quality problems in the Suisun Bay"; "The ammonia from the SRWTP may be acutely or chronically toxic to species, including copepods and freshwater mussels that reside in the Sacramento River and Sacramento-San Joaquin Delta"; and, "Ammonia in the SRWTP effluent combined with chlorine disinfection creates nitrosamines at levels 100 times greater than the primary MCL. Nitrosamines are highly mutagenic and potentially carcinogenic." (Tentative Permit at p. F-92.) These conclusory statements fail to support the finding that full nitrification is BPTC. (See sections II-III, ante, for detailed information on this topic.)

Following the statements regarding ammonia are two statements pertaining to the proposed equivalent to Title 22 filtration requirement. These issues are addressed fully in section I, ante, and other materials provided by the District.

The Tentative Permit includes a generic statement that "reduction or elimination of ammonia, nitrate and protozoans will reduce impacts to the beneficial uses of the Sacramento River and Sacramento-San Joaquin Delta from SRWTP discharge." However, the Tentative Permit provides no evidence that in fact advanced treatment of the SRWTP discharge provides tangible or certain benefits or otherwise leads to improved attainment of beneficial uses. As described previously in sections I, II, and III, ante, there is a lack of evidence that such benefits will occur.

The last two statements in the Tentative Permit are apparently designed to find that treatment requirements proposed are the same as other similarly situated dischargers. (Tentative Permit at p. F-92; see State Board Order No. WQ 2000-07, at pp. 10-11 ["One factor to be considered in determining best practicable treatment or control would be the water quality achieved by other similarly situated dischargers and the methods used to achieve that water quality."].) Along with these statements, the Tentative Permit includes Table F-18. (*Id.* at p. F-93.) The comparisons here are inaccurate and do not represent a comparison to "other similarly situated dischargers," as discussed below.

SRCSD Comments, page 74:

The District strongly objects to Table F-18, for many reasons. First, the Tentative Permit states in a footnote that the Table is based on a "telephone survey." There was no survey conducted. Rather, Regional Board staff selected and called certain specific municipal dischargers for information. Regional Board staff did not even speak to each of the entities listed in Table F-18, and in some instances staff provided the information in the table for a discharger without even having spoken to the discharger at all. There is no indication, anywhere, of what questions were asked, what the specific answers were, why these individual entities were chosen for "surveying" or why they are "similarly situated" to the District. Further, assuming that the goal of the "survey" was in some way to gather information regarding the costs of compliance with post-secondary treatment, an objective survey would have revealed the answer to be zero for many municipal dischargers. The purported survey identifies a "per capita" cost that is not based on appropriate information such as costs that have actually been incurred, financing methods, allocation among existing, new, and industrial users, or other factors that would affect the actual costs to residents, or the actual impacts in the specific community under consideration.

SRCSD Comments, page 94:

In addition, it is requested that a maximum permitted pH of 8.0 be used to calculate the acute ammonia criteria. It is appropriate to use a maximum pH permitted value of 8.0 because the District's effluent typically ranges between 6.2 and 7.3. Since at least 2000, it has never exceeded 8.0. Further, any changes to the treatment processes are not anticipated to cause the effluent to exceed 8.0. If an end-of-pipe limit based on the U.S. EPA criteria applies, the District would also request that the effluent pH and temperature be used to calculate the chronic criteria consistent with applying this effluent limit as an end-of-pipe limit (i.e., no dilution). The resulting effluent limits using the approach requested would be an AMEL of 3.0 mg/L and an MDEL of 3.9 mg/L for March 1-October 31, and an AMEL of 3.6 mg/L and MDEL of 4.7 mg/L for November 1-February 29.

<u>SRCSD Comments, pages 115-116</u>:

Requiring a discharger to conduct a study to develop an analytical method is not appropriate and well exceeds the Regional Board's authority. Studies for the development of test methods is an activity that is more appropriately conducted by or supported by U.S. EPA, which is the agency responsible for approving any test methodology before it can be used for permitting and compliance purposes. Typically, methods development requires the resources of a large government agency like the U.S. EPA, USGS, or a consensus body of experts like American Society of Testing and Materials (ASTM). It takes years to develop promulgated methods and it is unlikely that this method development would take a different path. Therefore, any method developed by the District under this requirement would be years away from becoming an approved method, and could be superseded by other efforts.

Further, the Tentative Permit's requirement for this study well exceeds the Regional Board's authority under Water Code section 13267. Water Code section 13267(b)(1) provides that, "[t]he regional board may require that any person who has discharged, . . . shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires." However, the Regional Board's authority under Water Code section 13267 is not unfettered. Any technical or monitoring program reports required pursuant to this authority must bear a reasonable relationship to the need for the report and the benefits to be obtained. (Wat. Code, § 13267(b)(1).) When requiring these reports, the Regional Board is required to provide a written request for the report and to identify the evidence necessary to support requiring the report. (*Ibid.*) Here, it has not been shown that the burden to be placed on the District for developing a new WET testing method using *H. azteca* is reasonable as compared to the need for the report.

The Tentative Permit also fails to provide any written explanation as to why the report is necessary, nor does it identify evidence supporting the requirement. The Tentative Permit merely states that, "[a] study is needed to determine if a 4 or 10 water column test for growth or 10 day survival or both growth and survival is best for determining toxicity." (Tentative Permit at p. F-108.) It provides no explanation or evidence as to why the District should be tasked with conducting this study of general applicability. For example, if the purpose is to develop a test for NPDES reporting of effluent toxicity, then the test will need to include acceptability criteria (e.g., Percent Minimum Significant Difference), inter-laboratory variability, and other elements that are considered in promulgated WET methods. These acceptability criteria would have to be developed by the District as part of method development studies and would represent a considerable effort and significant resources. As noted previously, development of WET testing methods is best done by, or under the control of U.S. EPA because it is the regulatory agency that must ultimately adopt the method as being appropriate for use in determining compliance with NPDES permits. It is not a reasonable study requirement to be placed on a single discharger like the District.

<u>SRCSD Comments, page 139</u>:

- As discussed in Section X, Monitoring and Reporting, the District has requested that this monitoring requirement be removed. However, if it remains, monitoring station SPL-001, municipal water supply, is referenced on page E-16. This station is not included in Table E-1, therefore its location is unclear.

<u>SRCSD Comments, page 142</u>:

  - Remove footnote 2. It appears to be a fragment and there is no link to footnote 2 in the table.

<u>SRCSD Comments, page 146</u>:

The permittee requests the following language clarification to the Tentative NPDES Permitted Options submitted with the Tentative Permit:

- Page 2. Under Dilution alternative 2, human carcinogen criteria only: The risk is listed for someone consuming 2L/year for 70 years. We suggest that the correct reference is 2L/<u>day</u> for 70 years.

<u>SRCSD Comments, page 146</u>:

In addition to the preceding, the District is providing additional, enclosed material as part of its comments and evidence, as follows.

We enclose documents completed by numerous individuals identified as testimony or comment (or both). Owing to the limitations on time to respond to the Tentative Permit, the immediately preceding materials do not necessarily include all of the content of each of these individuals' testimony/comment. Accordingly, all of such material is incorporated by reference as part of the District's comments. The individuals' documents themselves also attach certain materials to which they refer. Documents and exhibits referred to specifically in the testimony of Drs. Engle and Gerba are contained on one CD, which is included with the materials submitted with these comments.

cc: Attached Service List

SERVICE LIST

Regional Water Quality Control Board's (RWQCB) Adoption of
WDRs (NPDES Permit No. CA0077682) and Time Schedule Order for
Sacramento Regional County Sanitation District (SRCSD)

WATER BOARDS

Pamela Creedon, Executive Officer
Regional Water Quality Control Board,
Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670
Email: pcreedon@waterboards.ca.gov

Kenneth D. Landau, Assistant Executive Officer
Regional Water Quality Control Board,
Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670
Email: klandau@waterboards.ca.gov

DESIGNATED PARTIES:

"WATER AGENCIES"

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, ZONE 7 (Zone 7)

G.F. Duerig, General Manager
Alameda County Flood Control and Water
Conservation District, Zone 7
100 North Canyons Parkway
Livermore, CA 94551-9486
Email: jduerig@zone7water.com

Richard "Ren" E. Nosky, General Counsel
Alameda County Flood Control and Water
Conservation District, Zone 7
Downey Brand
3425 Brookside Road, Suite A
Stockton, CA 95219
Email: rnosky@downeybrand.com

David Aladjem, Esquire
Downey Brand
621 Capitol Mall, 18th Floor
Sacramento, CA 95814
Email: daladjem@downeybrand.com

ALAMEDA COUNTY WATER DISTRICT (ACWD)

Walter L. Wadlow, General Manager
Alameda County Water District
P.O. Box 5110
Fremont, CA 94537-5110

Michael B. McNaughton
Hanson Bridgett LLP
425 Market Street, 26th Floor
San Francisco, CA 94105
Email: mmcnaughton@hansonbridgett.com

CONTRA COSTA WATER DISTRICT (CCWD)

Jerry Brown, General Manager
Contra Costa Water District
P.O. Box H2O
Concord, CA 94524
Email: jbrown@ccwater.com

Robert B. Maddow, General Counsel
Bold Polisnr Maddow et al.
500 Ygnacio Valley Road, Suite 325
Walnut Creek, CA 94596
Email: Maddow@bpmnj.com

KERN COUNTY WATER AGENCY (KCWA)

James M. Beck, General Manager
Kern County Water Agency
P.O. Box 58
Bakersfield, CA 93302-0058
Email: erobinson@kmtg.com

Amelia Minaberrigarai, General Counsel
Kern County Water Agency
P.O. Box 58
Bakersfield, CA 93302-0058
Email: ameliam@kcwa.com

Eric N. Robinson, Esquire
Kronick, Moskovitz, Tiedemann & Girard
400 Capitol Mall, 27th Floor
Sacramento, CA 95814-4416
Email: erobinson@kmtg.com

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA (MWD)

Adam C. Kear, Sr. Deputy General Counsel
The Metropolitan Water District
of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153
Email: akear@mwdh2o.com

SAN LUIS & DELTA-MENDOTA WATER AUTHORITY (SLDMWA)

Jon D. Rubin, Esquire
Diepenbrock Harrison
400 Capitol Mall, Suite 1800
Sacramento, CA 95814
Email: jrubin@diepenbrock.com

SANTA CLARA VALLEY WATER DISTRICT (SCVWD)

Beau Goldie, Chief Executive Officer
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

Anthony Fulcher, Assistant District Counsel
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686
Email: AFulcher@valleywater.org

STATE WATER CONTRACTORS (SWC)

Terry Erlewine, General Manager
State Water Contractors
1121 L Street, Suite 1050
Sacramento, CA 95814
Email: terlewine@swc.org

Eric N. Robinson, Esquire
Kronick, Moskovitz, Tiedemann & Girard
400 Capitol Mall, 27th Floor
Sacramento, CA 95814-4416
Email: erobinson@kmtg.com

WESTLANDS WATER DISTRICT (Westlands)

Craig Manson, General Counsel
Westlands Water District
P.O. Box 6056
Fresno, CA 93703

Additional DESIGNATED PARTIES:

CENTRAL VALLEY CLEAN WATER ASSOCIATION (CVCWA)

Debbie Webster, Executive Officer
Central Valley Clean Water Association
P.O. Box 1755
Grass Valley, CA 95945
Email: eofficer@cvcwa.org

CALIFORNIA SPORTFISHING PROTECTION ALLIANCE (CSPA)

Bill Jennings, Executive Director
California Sportfishing Protection Alliance
3536 Rainier Avenue
Stockton, CA 95204
Email: deltakeep@aol.com

CAMPBELL SOUP COMPANY

Brett Buatti
Vice President, Manufacturing
Campbell Soup Co., Sacramento Operations
6200 Franklin Boulevard
Sacramento, CA 95824
Email: brett_buatti@campbellsoup.com

NORTH STATE BUILDING INDUSTRY ASSOCIATION
Dennis M. Rogers, Senior Vice President
Governmental and Public Affairs
North State Building Industry Association
1536 Eureka Road
Roseville, CA 95661-3055
Email: dennis@northstatebia.org