



**Main Office**

10060 Goethe Road  
Sacramento, CA 95827-3553  
Tele: [916] 876-6000  
Fax: [916] 876-6160

January 19, 2011

Delta Stewardship Council  
650 Capitol Mall  
Sacramento, CA 95814

Sent via e-mail [deltaplancomment@deltacouncil.ca.gov](mailto:deltaplancomment@deltacouncil.ca.gov)

**Sacramento Regional Wastewater**

**Treatment Plant**  
8521 Laguna Station Road  
Elk Grove, CA 95758-9550  
Tele: [916] 875-9000  
Fax: [916] 875-9068

Dear Council Members:

**Subject: Sacramento Regional County Sanitation District's Comments on the Delta Ecosystem, Delta Land Use/Socioeconomics, and Water Resources White Papers October-December, 2010**

The Sacramento Regional County Sanitation District (SRCSD) appreciates the opportunity to provide comments on the subject white papers. Overall, the Council has done a good job characterizing the current conditions in the Delta. We understand these white papers will not be revised, but will be incorporated into the baseline conditions in the Environmental Impact Report (EIR) and the Delta Plan when they are released.

**Board of Directors**

Representing:

- County of Sacramento
- County of Yolo
- City of Citrus Heights
- City of Elk Grove
- City of Folsom
- City of Rancho Cordova
- City of Sacramento
- City of West Sacramento

As requested in Council meetings, written comments are attached by White Paper, page and line number, for consideration in preparation of the Delta Plan and EIR (Attachment One). Our comments focus on possible ecosystem impacts of nutrients and increasing the use of recycled water as a water resource through land use/socioeconomics. Though we do not comment directly on the impacts of water exports from the Delta, we do agree with the assessment that water project diversions are a significant driver of the Delta ecosystem.

Overall, the broad generalizations in the white papers help the public understand Delta issues and how the Delta Plan is being developed. However, SRCSD believes the Delta Ecosystem white paper over simplifies the role of contaminants and toxics in the Delta and does not include recent research results. To provide the most recent studies and detailed understanding of SRCSD's discharge and its potential role in the Delta ecosystem, we are attaching our responses to the Central Valley Regional Water Quality Control Board's Staff Summary of the Tentative NPDES Permit (Attachment Two) and the Appeal of the NPDES Permit for our wastewater treatment facility (Attachment Three).

Thank you for considering SRCSD's comments. We look forward to working with the Council in the future. If the Council staff has any questions, please contact me at 916-876-6092 or [mitchellt@sacsewer.com](mailto:mitchellt@sacsewer.com).

Sincerely,

Terrie Mitchell  
Manager, Legislative and Regulatory Affairs

cc: Stan Dean, SRCSD District Engineer  
Prabhakar Somavarapu, SRCSD Director of Policy and Planning

- Stan R. Dean  
District Engineer
- Prabhakar Somavarapu  
Director of Policy and Planning
- Ruben R. Robles  
Director of Operations
- Marcia Maurer  
Chief Financial Officer
- Claudia Goss  
Director of Communications

Delta Stewardship Council  
SRCSD's Comments on the Delta Ecosystem, Delta Land Use/Socioeconomics, and Water Resources  
White Papers October-December, 2010  
January 19, 2011  
Page 2

- Attachment One:** SRCSD Comments on Delta Stewardship Council White Papers
- Attachment Two:** SRCSD's Response to the Central Valley Regional Water Quality Control Board Staff Summary of Tentative NPDES Permit, November 12, 2010
- Attachment Three:** SRCSD Petition for Review to the State Water Resources Control Board of NPDES Permit CA 0077682
- Attachment Four:** A Review of Delta Fish Population Losses from Pumping Operations in the Sacramento- San Joaquin River Delta, Prepared by Larry Walker Associates, January 2010
- Attachment Five:** List of Recent Werner Research Publications

## Attachment One

### Comments on the Delta Ecosystem White Paper, dated October 18, 2010

SRCSO has noted in many of the sections discussing contaminants, and ammonia in particular, that the most currently available science has not been referenced. We request you use the most recent, best available science, in describing the ecosystem baseline, especially in relationship to the role wastewater discharges may play in driving the ecosystem. SRCSO agrees with the summary table of drivers for a poorly functioning ecosystem in the Executive Summary, which shows that the largest contributors to a poorly functioning ecosystem are invasive species, dams, channel configuration, and Delta exports.

**Page 4-2, Table 4-1, “Indicators and Drivers of Poor Ecosystem Function”** is an excellent summary of the human modifications that drive ecosystem functionality. Clearly invasive species has affected the ecosystem greatly and is exasperated by nine out of 10 of the human modifications. Dams, channel configuration and Delta exports appear to be the next most significant contributors to a functioning ecosystem. SRCSO agrees with Table 4-1 that nutrient and contaminant loadings appear to be one of the least significant drivers in this poorly functioning ecosystem.

**Page 4-13, lines 10-12:** Please note there are two Werner et al 2008 reports and it is not clear which report is being referenced in this statement. Werner’s conceptual model included the possibility that nutrients from agricultural runoff or wastewater treatment plants may cause localized toxicity to aquatic organisms, but actual field data in later studies by Werner et al did not show any localized toxicity.

**Page 4-21, lines 35-40:** The direct impact of water diversions on the overall population dynamics of Delta smelt is not well understood and is an area where significant future research is needed. The effect of the SWP and CVP exports on phytoplankton, zooplankton, nutrients and organic material that support the base of the Delta food web is another area that needs additional research to determine the importance of these effects to Delta smelt and other POD species. SRCSO has attached a document prepared for SRCSO by Larry Walker Associates which synthesizes data and facts from existing reports and studies to provide a comprehensive look at what is known about the water project operations and the impact they have on Delta fish (Attachment Four).

**Page 4-22, lines 33 through 35:** A statement is attributed to Werner (2008) regarding sub-lethal toxicity. It would be very helpful to clarify if this is a hypothetical statement or is it based on Delta-specific research.

**Page 4-23, line 28:** The statement that mercury toxicity can lead to population declines of fish should be modified or qualified to state that it is not referring to POD species. As noted in the 2008 Alpers et al *Mercury Conceptual Model, Delta Regional Ecosystem Restoration Implementation Plan*, “The major limitation regarding effects for fish and wildlife is the lack of species-specific toxicity information on those organisms most at risk in the San Francisco Bay-Delta Estuary.”

**Page 4-24, line 16 through 19: SRCSO Comment: Page 4-24, line 16 through 19:** The 2006 and 2007 work by Werner asserting that ammonia may contribute to localized toxicity in Delta smelt is dated and known to be incorrect. SRCSO recommends this statement be eliminated or modified such that it recognizes more recent studies by Werner that yielded a different conclusion that ambient ammonia/ium concentrations do not contribute to reduced survival of Delta smelt. Attachment five provides a list of Dr. Werner’s references, some are included in this white paper, and others provide more recent information that should be considered for the baseline EIR.

**Comments on the Delta as a Place: Land Use White Paper dated November 8, 2010**

The Introduction section references Water Code Section 85022 which specifically implies conservation requirements, including recycled water, for regions that utilize Delta watershed as a source of water supply to become more self reliant. It should also be noted that conservation measures and improvements to water flowing into the Delta watershed is of equal importance. As such, SRCSD makes several recommendations to incorporate reference to a coordinated expansion of the recycled water program in the Sacramento region and in the upstream portions of the Delta and its tributaries that could provide significant benefits to the Delta watershed.

**Page 3-7 lines 14-17:** SRCSD requests that a clarification be made to this section shown below in bold. “Communities outside the Primary Zone currently are anticipated to continue releasing treated wastewater into Delta waterways (through wastewater discharge requirements issued by the Central Valley RWQCB), onto constructed wetlands, or onto agricultural lands **including discharges of recycled water.**”

**Page 4-11 Table 4-2:** DPC Land Use and Resource Management Plan Policies under subheading Utilities and Infrastructure P-4 “Encourage recycling programs for metals, glass paper, cardboard, and organic materials, in order to minimize waste generation...” SRCSD requests the addition of recycled water to the list of recycling programs in this section.

**Page 4-15 lines 6-24:** South Sacramento Habitat Conservation Plan (SSHCP) states on line 20 “Sacramento County is partnering with the incorporated cities of Rancho Cordova, Galt, and Elk Grove, as well as the Sacramento Regional County Sanitation District and Sacramento County Water Agency, to further advance the regional planning goals of the SSHCP (Sacramento County, 2010). SRCSD recommends adding a statement to this section referencing section 5.4.2 of the SSHCP that discusses the development of recycled water supplies to “support agricultural lands and to improve aquatic and terrestrial habitat on existing and future conservation lands near the Cosumnes River Preserve.” This section should specifically encourage the SSHCP partners to continue efforts to expand the regional recycled water program which could be a significant step toward an integrated approach to water, land use and resource management planning to achieve multiple objectives as described in this white paper.

**Page 5-2 lines 10-20:** SRCSD recommends that “increased recycled water supply and distribution” be added to the bullets for consideration of future policy issues to address the risks that face the Delta. An increase in the use of recycled water in the vicinity of the Sacramento River and the Cosumnes River would help to address the future risks listed in this section including agriculture, water supply and water quality. An investment in the production and distribution of recycled water in the Delta primary and secondary zones would provide multiple benefits including the provision of a new, sustainable supply of water that could be used to support agriculture, wetlands and other habitat areas, while decreasing the demands on surface and groundwater. Investing in programs like water recycling help achieve an integrated approach to water, land use and resource management planning.

## Attachment One

### **Comments on the Water Resources White Paper, dated December 8, 2010**

**Pages 3-21-22:** As requested at the December 16, 2010 Delta Stewardship Council meeting, SRCSD would like the following recycled water program added as a case study of recycled water use in the Delta. This case study demonstrates the issues regarding cost of infrastructure for increased recycled water reuse, and is specific to the Delta Region.

The Sacramento Regional County Sanitation District (SRCSD) safely treats and disinfects an average of 150 million gallons a day (mgd) of municipal wastewater - water that could be put to beneficial use as a recycled water supply for the Sacramento region. Unfortunately, most of this valuable and reliable water supply is not being recycled due to a lack of funding to construct the required infrastructure.

Currently, SRCSD's Water Reclamation Facility produces an average of 3 mgd of tertiary recycled water delivered seasonally for landscape irrigation in south Sacramento County, with a capacity to deliver up to 5 mgd. The design for a facility expansion up to 10 mgd is complete and the design for an additional water transmission pipeline is in progress. However, construction for the overall expansion project is on hold due to a lack of funding for the distribution pipeline and other necessary infrastructure. The capital cost for the water treatment facility expansion is estimated at \$18 million. State grants in the amount of \$5.4 million have been awarded for the facility expansion. The estimated cost for the storage, pumping and distribution system is estimated at \$17 million.

Recycled water is a valuable commodity that can be an important resource in the regions overall water portfolio. SRCSD can supply substantial amounts of high-quality recycled water with multiple benefits for multiple uses. In 2007, SRCSD completed a Water Recycling Opportunities Study that identified several local and regional projects that could benefit from the use of recycled water. The South Sacramento County Agriculture and Habitat Lands Water Recycling Project is one of the projects identified by this study. This project would provide a safe and reliable supply of tertiary treated water for up to 8000 acres of land used for agricultural, conservation and mitigation purposes.. This project has multiple benefits including reducing local groundwater pumping, support of habitat restoration efforts, and providing near-term benefits to the Sacramento-San Joaquin Delta and the region. Other future projects that might be possible through a regional collaboration include the establishment of a local groundwater banking system and the use of recycled water for recharge of local surface waters such as the Cosumnes River.

SRCSD wants to participate in solving the State's water supply issue by expanding our water recycling program in the Sacramento region. We have recently taken the lead in forming the Sacramento Water Recycling Coalition, a group of members that includes local water purveyors, representatives of agricultural and wildlife habitat groups, cities, county departments, local water authorities, and others who are interested in expanding the use of recycled water in our region. The purpose of this coalition is to collaborate to gain support for recycled water projects in the Sacramento area that have regional benefits while building the framework to support a regional comprehensive water reuse program. However, in order to expand the use of recycled water on a regional scale, state and federal funding will be needed to help offset project costs and to guide the future direction for water recycling in the Sacramento region. Strong partnerships and commitment will be required from local utilities, water purveyors and community leaders to support and promote the expansion and development of a comprehensive recycled water program for the greater Sacramento region. SRCSD's goal is to increase water recycling throughout the Sacramento region up to 30 to 40 million gallons per day (MGD) over the next 20 years.



Technology in balance with nature

**Main Office**

10060 Goethe Road  
Sacramento, CA 95827-3553

Tele: [916] 876-6000  
Fax: [916] 876-6160

**Sacramento Regional Wastewater**

**Treatment Plant**  
8521 Laguna Station Road  
Elk Grove, CA 95758-9550

Tele: [916] 875-9000  
Fax: [916] 875-9068

**Board of Directors**  
Representing:

- County of Sacramento
- County of Yolo
- City of Citrus Heights
- City of Elk Grove
- City of Folsom
- City of Rancho Cordova
- City of Sacramento
- City of West Sacramento

- Stan R. Dean  
*District Engineer*
- Prabhakar Somavarapu  
*Director of Policy and Planning*
- Ruben R. Robles  
*Director of Operations*
- Marcia Maurer  
*Chief Financial Officer*
- Claudia Goss  
*Director of Communications*

November 12, 2010

Kenneth Landau  
Assistant Executive Officer  
Central Valley Regional Water Quality Control Board  
11020 Sun Center Drive, Suite 200  
Rancho Cordova, CA 95670

**Subject: Sacramento Regional County Sanitation District's Response to the Central Valley Regional Water Quality Control Board Staff Summary of Tentative NPDES Permit**

Dear Mr. Landau:

The Sacramento Regional County Sanitation District (District) has important concerns related to a document posted by the Central Valley Regional Water Quality Control Board (Regional Board) staff on the Regional Board's website on October 13, 2010, and then again on October 18, 2010. This document, titled "Sacramento Regional Sanitation District Wastewater Treatment Plant (District) Summary of Tentative NPDES Permit," purports to justify the tentative NPDES permit released on September 3, 2010.

In our view, the document in question contradicts statements in the tentative permit and presents an inaccurate portrayal of the impact of the District's Sacramento Regional Wastewater Treatment Plant (SRWTP) discharge on the Delta and the benefits of implementing the NPDES permit proposed by Regional Board staff. Our general understanding of the purpose of the document is that it was to serve informational purposes for persons who might not read the tentative permit or take time to become fully familiar with the issues. While our concerns relate to the document as a whole, we wish to bring to your attention the following specific comments. In particular, identified below are statements from the document that we believe are inaccurate or misleading, and our reasons for that belief.

1. "The draft permit does **not** establish more stringent requirements than those imposed on any other treatment plant within the Central Valley that are required to meet tertiary treatment requirements." [p. 4]
2. "Tertiary treatment is the standard level of treatment now required of most dischargers to rivers in the Central Valley ... ." [p. 4]

District's Perspective: The Regional Board has routinely based decisions regarding tertiary filtration requirements on whether or not the receiving water as compared to the effluent achieves 20:1 dilution as a daily average. Using this criterion, the Regional Board has routinely developed and adopted permits where tertiary filtration is not necessary to meet total coliform requirements. For example, in a review of 63 permits adopted between 2007 and 2010, 23 permits (37 %) were for discharges with at least 20:1 dilution, none of whom were required by the Regional Water Board to meet

## Attachment Two

Mr. Kenneth Landau

Re: SRCSD Response to Regional Board Summary of Tentative NPDES Permit

November 12, 2010

Page 2

tertiary filtration disinfection requirements<sup>1</sup>. Clearly, the tentative permit imposes new requirements that are more stringent than the requirements imposed on any other Central Valley POTW that is similarly situated to the District. The tentative permit imposes total Coliform limits that are consistent with those imposed on discharges to effluent dominated water bodies.

3. "Dilution was allowed for 11 of the 13 pollutants for which dilution could legally be provided." [p. 5]

District's Perspective: In fact, actual dilution that occurs in the Sacramento River was used for only one of the 13 constituents in question (i.e., dibenzo(a,h)anthracene). In ten cases, strict performance-based limits were proposed instead of the water quality-based limitations calculated from the available dilution. In addition, dilution could have legally been allowed for all of the 13 constituents.

4. "Not improving treatment by the District's facility ... may ... Increase costs of drinking water treatment systems ... to remove pathogens ... ." [pp. 5-6]

District's Perspective: In fact, no drinking water systems incur additional costs for pathogen treatment due to the District's discharge. Levels of *Cryptosporidium* at Delta drinking water intakes influenced by the Sacramento River are typically below detection levels and are not adversely affected at the District's current level of treatment.

5. "New information from USEPA and other research entities indicates that 'tertiary' filtration can reduce pharmaceuticals and other emerging constituents of concern in municipal wastewater." [p. 3]
6. "'Tertiary filtration' will ... significantly reduce ... metals ... organic chemicals, pesticides ... and emerging chemicals of concern such as pharmaceuticals and personal care products." [p. 4]

District's Perspective: The water quality benefits of filtration are not significant, as shown in the District's *Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant* and the District's *Antidegradation Analysis for Proposed Discharge Modification for the Sacramento Regional Wastewater Treatment Plant* submitted to the Regional Board in May 2010 and May 2009, respectively. The information provided in these reports has not been disputed by Regional Board staff, while on the other hand, evidence supporting a claim of significant tertiary filtration benefits is not provided in the tentative permit. Note that the tentative permit is more objective on this point, stating that additional treatment "may also reduce concentrations of other constituents [such as CEC] ... although whether or not reduction of these chemicals occur, and the magnitude of such reductions, is not known." (Tentative permit at p. F-75.) The U.S. EPA published a report in August 2010 titled: "Treating Contaminants of Emerging Concern: A Literature Review Database."<sup>2</sup> The report contains a peer-reviewed summary of wastewater treatment technologies and their ability to remove CECs based on the review of over 400 published articles or reports. The report is a companion to the U.S. EPA's "CEC Removals Database," a Microsoft Access® database housing the findings of the literature. While wastewater treatment plants are not designed to specifically remove CECs, studies have shown that both secondary and advanced treatment do result in CEC removal. Removal from wastewater varies depending on type of treatment and as well as type of CEC.

<sup>1</sup> For complete accuracy, Ironhouse Sanitary District and the City of Angels themselves proposed Title 22 tertiary quality discharges and the permits for those agencies thus require effluent of this quality. None of the remaining entities was required to meet limits being proposed for the District.

<sup>2</sup> EPA-820-R-10-002. <http://water.epa.gov/scitech/swguidance/ppcp/results.cfm>.

## Attachment Two

Mr. Kenneth Landau

Re: SRCSD Response to Regional Board Summary of Tentative NPDES Permit

November 12, 2010

Page 3

The statement in the Summary of the Tentative NPDES Permit is that “tertiary” filtration can reduce pharmaceuticals and other emerging constituents of concern in municipal wastewater. This statement is misleading, as the U.S. EPA does not single out tertiary filtration in the August 2010 report as a preferred way to reduce CECs. Similarly, the report does not support the notion that tertiary filtration adds a significant benefit in reducing this class of compounds. It should also be noted that neither the tentative permit nor the document in question identifies any specific environmental relevance of concentrations of CECs that may occur in the Sacramento River and Delta, let alone how those levels might or might not change with filtration.

7. “Drinking water agencies downstream of the District’s discharge must increase their levels of treatment if nitrate in the downstream surface waters exceed maximum contaminant levels.” [p. 5]

District’s Perspective: This is a non-issue. The Sacramento Regional Wastewater Treatment Plant’s (SRWTP) discharge will not cause nitrate levels downstream of its discharge to exceed or even approach drinking water standards for nitrate (i.e., maximum contaminant levels) under any projected future scenario, the tentative permit does not suggest otherwise.

8. “The discharge accounts for over 60% of all the municipal wastewater discharged to the Delta.” [p. 1]

District’s Perspective: The pie chart included in the Regional Board staff document greatly overstates and visually over-represents the impact of the SRWTP effluent in the Delta, since the aggregate of *all* treated wastewater is a relatively small input to the Delta. A more accurate presentation is to show the percentage of the SRWTP effluent at various locations throughout the Delta, which is acknowledged to average 1.25 percent in the Tentative Order, NPDES Permitting Options document.

9. “Scientific experts have expressed concern that ammonia levels in the Sacramento River and Delta could be chronically toxic to smelt.” [p. 3]

District’s Perspective: Ammonia concentrations downstream of the discharge are below levels established by U.S. EPA for protection of aquatic life. Multiple recent studies and evaluations have shown that acute or chronic ammonia toxicity to Delta fish populations has not been demonstrated. The expression of concern by some researchers regarding effects of ammonia at very low concentrations is not a basis for permitting decisions and should not be highlighted as such.

10. “Ammonia is an oxygen-demanding substance and the ammonia in the District’s discharge is a major cause of reduced oxygen in the Delta attributed to the District’s discharge.” [p. 3]

District’s Perspective: This creates a false impression regarding the effect of the SRWTP’s discharge on dissolved oxygen (DO) levels in the Delta. The District’s influence is limited to the Lower Sacramento River, where reliable data indicates that DO levels have met Basin Plan objectives at the District’s current level of treatment over the operational history of the SRWTP. Through the Low Dissolved Oxygen Prevention Assessment (LDOPA), the District determined the level of oxygen demanding substances allowable in future SRWTP discharges to maintain the Basin Plan objective for DO under extreme drought conditions.

11. “... the District’s discharge increases the health risk of illness ... by 1.3 to 3.7 times ... posing an increased health risk to people contacting the water (swimming, water skiing, etc.)” [p. 3]

District’s Perspective: This statement creates a false impression regarding the magnitude of SRWTP’s impact on health risk. In fact, the District’s discharge does not create an unacceptable health risk. The statement is misleading because it fails: to acknowledge layers of conservative and worst-case assumptions that relate to the figures stated; place the figures in any context; or, recognize that risk downstream from the discharge

## Attachment Two

Mr. Kenneth Landau

Re: SRCSD Response to Regional Board Summary of Tentative NPDES Permit

November 12, 2010

Page 4

easily meets the national U.S. EPA criteria established to protect people contacting recreational waters by orders of magnitude, the same criteria that are used by the State of California to protect contacting recreational activities at Southern California beaches. A leading expert has found no meaningful effect on risk of illness from the current discharge. The document also fails to acknowledge that there is no evidence that any health problem actually exists.

12. "Not improving treatment by the District's facility will result in continued discharge of harmful levels of ... pollutants ... and may:

a. "Negatively impact food supply for Delta fish." [p. 5]

District's Perspective: The tentative permit's fact sheet admits that this area of knowledge is incomplete. This statement is misleading without stating the converse, that increasing treatment may not have any effect on the food web. Also, use of language such as "harmful levels of pollutants" is one example of how the overall tone and slant of the document is not appropriate.

b. "Negatively impact resident and migratory fish through toxicity and reduced food sources." [p. 5]

District's Perspective: No toxicity to fish has been shown in numerous studies. The impact on the food supply is a hypothesis and is not a basis for permitting decisions.

c. "Negatively impact commercial and recreational fishing." [p. 5]

District's Perspective: No evidence exists or is provided in the tentative permit to show that the current discharge has an impact on commercial and recreational fishing in the Delta. On the other hand, ample evidence is available that other factors not acknowledged have significant impacts on commercial and recreational fishing.

d. "Negatively impact jobs that depend upon commercial and recreational fishing." [p. 5]

District's Perspective: No evidence exists or is provided in the tentative permit to substantiate the claim that the current discharge has an impact on the jobs that depend upon commercial and recreational fishing.

e. "Negatively impact the ability to pump water from the Delta for drinking water and agricultural irrigation supplies." [p. 5]

District's Perspective: No credible science exists or is offered in the tentative permit to make a connection between the SRWTP discharge and the ability of exporters to pump water from the Delta.

f. "Result in social and economic impacts caused by people getting sick from contacting the River water." [p. 5]

District's Perspective: The evidence is to the contrary, and certainly there is no evidence of "social and economic impacts caused by people getting sick." Again, the accusatory tone used in the document is not appropriate. The likelihood and incidence of sickness in people using the Sacramento River for contact recreation is very small and there is no meaningful public health risk. The tentative permit offers no evidence of any actual increase in illness in the Sacramento River downstream from the SRWTP discharge.

Attachment Two

Mr. Kenneth Landau

Re: SRCSD Response to Regional Board Summary of Tentative NPDES Permit

November 12, 2010

Page 5

- g. "Continue discharges of pathogens to ... waters that are used by agriculture for irrigation." [p. 6]

District's Perspective: The current disinfection level protects all downstream agricultural uses along the Sacramento River in accordance with established U.S. EPA criteria and applicable Department of Public Health policies.

- h. "Continue discharges of mercury and methylmercury that contribute to impairment of the Delta... ." [p. 6]

District's Perspective: As noted in the Regional Board's Delta mercury TMDL, wastewater discharges in the aggregate (including the SRWTP) are considered a minor source of mercury and methylmercury to the Delta. The District's methylmercury loading essentially meets the prescribed loading limits in the TMDL.

In closing, the District is concerned that this document may be used by others to advocate for the tentative permit requirements released on September 3, 2010. The District is also concerned that the Regional Board members may be under a mistaken impression or unduly influenced by this document and that this may impair full and objective evaluation of the relevant facts in the Board's decision on the tentative permit.

Thank you for considering this letter. Please feel free to contact me at [deans@sacsewer.com](mailto:deans@sacsewer.com) or 916-875-9101 if you have any questions.

Sincerely,



Stan R. Dean  
District Engineer

Attachment: Proof of Service

Attachment Two

**PROOF OF SERVICE**

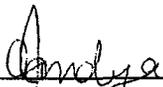
I am employed in the County of Sacramento; my business address is 10060 Goethe Road, Sacramento, California; I am over the age of 18 years and not a party to the foregoing action.

On November 12, 2010, I served a true and correct copy of:

**SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT'S RESPONSE TO  
THE CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD STAFF  
SUMMARY OF TENTATIVE NPDES PERMIT**

by placing the document listed above in a sealed envelope with postage thereon fully prepaid, in the United States mail at Sacramento, California, addressed as set forth in the attached Service List.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 12, 2010, at Sacramento, California.

  
\_\_\_\_\_  
Vyomini Pandya

**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

Phone: (916) 464-3291 (main)  
Fax: (916) 464-4645  
Email: [pcreedon@waterboards.ca.gov](mailto: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

Phone: (916) 464-4726 (direct)  
Fax: (916) 464-4645  
Email: [klandau@waterboards.ca.gov](mailto:klandau@waterboards.ca.gov)

David P. Coupe, Staff Counsel  
Office of Chief Counsel  
State Water Resources Control Board  
1001 I Street, 22nd Floor  
Sacramento, CA 95814

Phone: (510) 622-2306 (direct)  
Email: [dcoupe@waterboards.ca.gov](mailto:dcoupe@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

Phone: (925) 454-5000  
Fax:  
Email: [jduerig@zone7water.com](mailto: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

Phone: (209) 473-6450  
Fax: (209) 473-6455  
Email: [rnosky@downeybrand.com](mailto:rnosky@downeybrand.com)

David Aladjem, Esquire  
Downey Brand  
621 Capitol Mall, 18th Floor  
Sacramento, CA 95814

Phone: (916) 520-5361 (direct)  
Fax: (916) 520-5761  
Email: [daladjem@downeybrand.com](mailto:daladjem@downeybrand.com)

Attachment Two

**SANTA CLARA VALLEY WATER DISTRICT (SCVWD)**

Beau Goldie, Chief Executive Officer      Phone: (408) 265-2600  
Santa Clara Valley Water District      Fax: (408) 266-0271  
5750 Almaden Expressway      Email:  
San Jose, CA 95118-3686

Anthony Fulcher, Assistant District Counsel      Phone: (408) 265-2600  
Santa Clara Valley Water District      Fax: (408) 266-0271  
5750 Almaden Expressway      Email: [AFulcher@valleywater.org](mailto:AFulcher@valleywater.org)  
San Jose, CA 95118-3686

**STATE WATER CONTRACTORS (SWC)**

Terry Erlewine, General Manager      Phone: (916) 447-7357  
State Water Contractors      Fax:  
1121 L Street, Suite 1050      Email: [terlewine@swc.org](mailto:terlewine@swc.org)  
Sacramento, CA 95814

Eric N. Robinson, Esquire      Phone: (916) 321-4576 (direct)  
Kronick, Moskovitz, Tiedemann & Girard      (916) 321-4500 (main)  
400 Capitol Mall, 27th Floor      Fax: (916) 321-4555  
Sacramento, CA 95814-4416      Email: [erobinson@kmtg.com](mailto:erobinson@kmtg.com)

**WESTLANDS WATER DISTRICT (Westlands)**

Craig Manson, General Counsel      Phone: (559) 224-1523  
Westlands Water District      Fax: (559) 241-6277  
P.O. Box 6056      Email:  
Fresno, CA 93703

**Additional DESIGNATED PARTIES:**

**CENTRAL VALLEY CLEAN WATER ASSOCIATION (CVCWA)**

Debbie Webster, Executive Officer      Phone: (530) 268-1338  
Central Valley Clean Water Association      Fax:  
P.O. Box 1755      Email: [eofficer@cvcwa.org](mailto:eofficer@cvcwa.org)  
Grass Valley, CA 95945

**CALIFORNIA SPORTFISHING PROTECTION ALLIANCE (CSPA)**

Bill Jennings, Executive Director      Phone: (209) 464-5067  
California Sportfishing Protection Alliance      Fax: (209) 464-1028  
3536 Rainier Avenue      Email: [deltakeep@aol.com](mailto:deltakeep@aol.com)  
Stockton, CA 95204

**CAMPBELL SOUP COMPANY**

Brett Buatti      Phone: (916) 395-5110  
Vice President, Manufacturing      Fax:  
Campbell Soup Co., Sacramento Operations      Email: [brett\\_buatti@campbellsoup.com](mailto:brett_buatti@campbellsoup.com)  
6200 Franklin Boulevard  
Sacramento, CA 95824

Attachment Two

**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

Phone: (916) 751-2750 (direct)  
(916) 677-5717 (main)  
Fax: (916) 677-5734  
Email: [dennis@northstatebia.org](mailto:dennis@northstatebia.org)

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

6 SOMACH SIMMONS & DUNN  
 A Professional Corporation  
 7 PAUL S. SIMMONS, ESQ. (SBN 127920)  
 THERESA A. DUNHAM, ESQ. (SBN 187644)  
 8 ROBERTA L. LARSON, ESQ. (SBN 191705)  
 CASSIE N. AW-YANG, ESQ. (SBN 233697)  
 9 500 Capitol Mall, Suite 1000  
 Sacramento, CA 95814  
 10 Telephone: (916) 446-7979  
 Facsimile: (916) 446-8199

11 Attorneys for Petitioner  
 12 SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT

13  
 14 BEFORE THE  
 15 CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

17 In the Matter of the Sacramento Regional County  
 Sanitation District's Petition for Review of  
 18 Action and Failure to Act by Regional Water  
 Quality Control Board, Central Valley Region, in  
 19 Adopting Waste Discharge Requirements Order  
 No. R5-2010-0114 (NPDES No. CA0077682)  
 20 and Time Schedule Order No. R5-2010-0115 for  
 Sacramento Regional County Sanitation District,  
 21 Sacramento Regional Wastewater Treatment  
 Plant.

SWRCB/OCC File No. \_\_\_\_\_  
 PETITION FOR REVIEW  
 (Wat. Code, § 13320)

22  
 23 Petitioner Sacramento Regional County Sanitation District (District or SRCSD), in  
 24 accordance with section 13320 of the Water Code and sections 2050 et seq. of Title 23 of the  
 25 California Code of Regulations, hereby petitions for review of Waste Discharge Requirements  
 26 Order No. R5-2010-0114 (NPDES No. CA0077682) and Time Schedule Order  
 27 No. R5-2010-0115 of the Central Valley Regional Water Quality Control Board (Regional Board  
 28 or RWQCB) and action or inaction of the RWQCB associated therewith.

SOMACH SIMMONS & DUNN  
 A Professional Corporation

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](mailto: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](mailto:psimmons@somachlaw.com)  
 Email: [tdunham@somachlaw.com](mailto: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](mailto:ryanr@saccounty.net)  
 Email: [travisl@saccounty.net](mailto: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

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

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

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

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

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

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

10 5. THE MANNER IN WHICH PETITIONER IS AGGRIEVED

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

14 6. THE SPECIFIC ACTION REQUESTED BY PETITIONER

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

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

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

23 i. Vacate all of the following:

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

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

1 footnote 1 (p. 14 of the Permit) insofar as it relates to total coliform  
 2 organisms;  
 3 the Construction, Operation and Maintenance Specifications for turbidity  
 4 contained in Provision VI.C.4.a of the Permit (p. 30);  
 5 the Other Special Provisions requiring wastewater to be oxidized,  
 6 coagulated, filtered, or equivalent by 1 December 2020 contained in Provision VI.C.6.a;  
 7 the interim effluent limitations for BOD, TSS, and total coliform organisms  
 8 contained in sections IV.A.2.a and IV.A.2.c of the Permit (p. 16); and,  
 9 the compliance schedule for Title 22 of the California Code of Regulations  
 10 (Title 22), or Equivalent, Disinfection Requirements contained in Provision VI.C.7.a of  
 11 the Permit (pp. 33-34) as well as the reporting requirements related thereto contained in  
 12 Table E-3a footnote 13 (p. E-7) and in Table E-9 of the Permit (p. E-22);

13 ii. Order that the final effluent limitations under the Permit for BOD, TSS,  
 14 and total coliform organisms<sup>1</sup> shall be as follows:

15 BOD: 30 mg/L and 45,286 lbs/day as a monthly averages, 45 mg/L and  
 16 67,929 lbs/day as a weekly averages, and 60 mg/L and 90,572 lbs/day as a daily  
 17 maximums;

18 TSS: 30 mg/L and 45,286 lbs/day as a monthly averages, 45 mg/L and  
 19 67,929 lbs/day as a weekly averages, and 60 mg/L and 90,572 lbs/day as a daily  
 20 maximums; and,

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

24  
 25  
 26 <sup>1</sup> As reflected in section V of the Statement of Points and Authorities following, these limitations are derived from  
 27 Disinfection Alternative No. 1, Sacramento County Sanitation District [sic], Sacramento Regional Wastewater  
 28 Regional Water Quality Control Board, Central Valley Region Board Meeting – 9 December 2010, Item #6  
 (document distributed November 24, 2010).

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

6 i. Vacate all of the following:

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

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

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

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

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

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

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

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

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

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

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

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

10 i. Vacate all of the following:

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

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

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

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

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

27 \_\_\_\_\_  
 28 <sup>2</sup> 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.

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

3 i. Vacate all of the following:

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

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

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

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

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

15 ii. Remand all of the following:

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

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

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

27 the numeric toxicity monitoring trigger for chronic whole effluent toxicity  
28 to the Regional Board for adoption of a numeric toxicity monitoring trigger for chronic

1 whole effluent toxicity with the allowance of chronic mixing zones and dilution credits of  
2 13.3 as calculated with the dynamic model; and,

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

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

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

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

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

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

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

21 A true and correct copy of this Petition was mailed by First Class mail on January 10,  
22 2011, to the Regional Board at the following address:

23 Pamela Creedon  
24 Executive Officer  
25 California Regional Water Quality Control Board, Central Valley Region  
26 11020 Sun Center Drive, #200  
27 Rancho Cordova, CA 95670

28 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.

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

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

5 10. PETITIONER'S REQUEST FOR CONSIDERATION OF SUPPLEMENTAL  
6 EVIDENCE

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

9  
10 **STATEMENT OF POINTS AND AUTHORITIES**

11 **I. INTRODUCTION**

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

21 Over one-half the estimated compliance cost is for filtration technology even though  
22 Sacramento River water quality is, with the current discharge, superior to adopted water quality  
23 standards for pathogens. The record shows that the requirement would have *de minimus* benefit  
24 in terms of avoiding potential risk of gastrointestinal illness to persons who may ingest river  
25 water directly. In developing the requirements, the Regional Board did not fairly or accurately  
26 characterize evidence and ignored highly relevant, uncontroverted evidence altogether. It also  
27 deviated from its standard permitting practice for discharges to high-volume receiving waters.  
28 Further, the Regional Board gave cursory and superficial attention to its obligations under

1 section 13241 of the Water Code, a pillar of water quality regulatory law, and its findings related  
2 to imposing the requirements are perfunctory and simply wrong. The District's predecessor  
3 permit (Order No. 5-00-188) ensured a high degree of protection related to pathogens and its  
4 provisions should have been retained.

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

26 The Permit's limitations on nitrate suffer from the same deficiencies as ammonia, except  
27 that the Permit lacks *even an effort* to explain why a mixing zone for nitrate is denied. In this  
28 regard, the District acknowledges that numeric water quality objectives exist for nitrate to protect

1 municipal use. Discharge equal to that objective is unnecessary to protect that use because the  
 2 use occurs far downstream after considerable dilution. The Permit materials acknowledge as  
 3 much, but deny a mixing zone for reasons that simply cannot be determined from the Permit or its  
 4 findings. There is no justification for the effluent limitation.

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

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

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

## 15 II. BACKGROUND

### 16 A. District Operation

17 The District owns and operates the SRWTP. The “Background and Facility Description”  
 18 Findings of the Permit (sections II.A, B) are accurate. Decades ago, the District through the  
 19 SRWTP, accomplished regionalization of wastewater treatment and disposal, replacing  
 20 22 separate treatment plants.<sup>3</sup>

21 In 2000, the Regional Board adopted Order No. R5-00-188, renewing the waste discharge  
 22 requirements and NPDES permit (No. CA0077682) for the SRWTP. The District has an  
 23 exemplary record of compliance with that permit. In addition, the District is a leader in  
 24 promoting watershed-wide understanding and collaboration in water quality issues, and is an  
 25 active participant in relevant activities in the region related to water quality planning. The  
 26

27 <sup>3</sup> Meeting, State of California, Central Valley Regional Water Quality Control Board, Partial Transcript (Dec. 9,  
 28 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.

1 District has realized great success in its source control efforts, including, for example, with  
2 respect to mercury.<sup>4</sup>

### 3 **B. Permit Renewal Process**

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

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

19 <sup>4</sup> The predecessor permit included an interim performance-based effluent limitation for total mercury of 5.1 pounds  
20 per year. (Order No. R5-00-188, p. 15.) As a result of the District’s source control efforts, the actual mercury mass  
21 loading from the SRWTP has been lower than that limit, such that the Permit establishes a new, interim performance-  
22 based limit of more than 50 percent lower than the previous performance-based limit. (Permit, pp. 15, F-71.) The  
23 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.)

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

26 <sup>6</sup> Larry Walker Associates, Antidegradation Analysis for Proposed Wastewater Treatment Plant Discharge  
Modification (Feb. 2005 and May 20, 2009).

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

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

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

20 On November 24, 2010, Regional Board staff released a revised tentative permit and  
 21 revised tentative TSO and other materials<sup>11</sup> for consideration by the Regional Board or a Regional

22 \_\_\_\_\_  
 23 <sup>8</sup> 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.

24 <sup>9</sup> Numerous other parties requested, and were ultimately granted, designated party status in accordance with Title 23  
 25 of the California Code of Regulations, sections 648(b) and 648.1(a). These parties included numerous agencies who  
 26 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.

27 <sup>10</sup> See District's October 2010 Comments and Evidence Letter, pp. 146-147.

28 <sup>11</sup> The documents referenced here are accessible at:  
[www.waterboards.ca.gov/centralvalley/board\\_decisions/tentative\\_orders/1012/index.shtml#6](http://www.waterboards.ca.gov/centralvalley/board_decisions/tentative_orders/1012/index.shtml#6) (as of Jan. 10, 2011).

1 Board panel at a December 9-10 meeting. Relevant here, the materials included: Staff Report,  
 2 Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment  
 3 Plant, Proposed NPDES Permit Renewal and Time Schedule Order, Sacramento County (Staff  
 4 Report); a revised tentative permit reflecting staff's proposal (California Regional Water Quality  
 5 Control Board, Central Valley Region, Order No. R5-2010-XXXX [NPDES No. CA0077682]  
 6 Waste Discharge Requirements for the Sacramento Regional County Sanitation District,  
 7 Sacramento Regional Wastewater Treatment Plant, Sacramento County (November Tentative  
 8 Permit)); an "Underline/Strikeout" version of the November Tentative Permit, reflecting changes  
 9 that had been made to the September Tentative Permit in creating the November Tentative Permit  
 10 (California Regional Water Quality Control Board, Central Valley Region, Order  
 11 No. R5-2010-XXXX [NPDES No. CA0077682] Waste Discharge Requirements for the  
 12 Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment  
 13 Plant, Sacramento County (November Redline Tentative Permit))<sup>12</sup>; a revised TSO representing  
 14 staff's proposal (California Regional Water Quality Control Board, Central Valley Region, Time  
 15 Schedule Order No. R5-2010-XXXX Requiring the Sacramento Regional County Sanitation  
 16 District, Sacramento County, to Comply with Requirements Prescribed in Order  
 17 No. R5-2010-XXXX [NPDES Permit No. CA0077682] (November Tentative TSO)); an  
 18 "Underline/Strikeout" version of the November Tentative TSO, reflecting changes that had been  
 19 made to the September Tentative TSO in creating the November Tentative TSO (California  
 20 Regional Water Quality Control Board, Central Valley Region, Time Schedule Order  
 21 No. R5-2010-XXXX Requiring the Sacramento Regional County Sanitation District, Sacramento  
 22 County, to Comply with Requirements Prescribed in Order No. R5-2010-XXXX [NPDES Permit  
 23 No. CA0077682] (November Redline Tentative TSO)); revised versions of the September  
 24

25 \_\_\_\_\_  
 26 <sup>12</sup> The discussion in this Statement of Points and Authorities includes several citations to the November Redline  
 27 Tentative Permit. For the State Board's information, the November Redline Tentative Permit includes certain  
 28 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.

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

3 On December 8, 2010, Regional Board staff released its proposed "Late Revisions" to the  
4 November Tentative Permit.<sup>13</sup>

5 The 2010 renewal of the Permit occurred ten years after the previous renewal, a period  
6 that is longer than typical for NPDES permits in the region. At the same time, the District  
7 submits, the renewal was characterized by haste, particularly as related to major issues that are  
8 subjects of this Petition. An overriding objective became the adoption of the renewal permit in  
9 2010. The September Tentative Permit and September Tentative TSO provided the first specific  
10 indication of staff's recommended action on key issues. There were important oversights,  
11 omissions, and inconsistencies in those tentative orders, many identified below and in District  
12 comments. The District and others generated and submitted a considerable volume of comments  
13 and other material in the five-week comment period ending October 11, 2010.

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

25 \_\_\_\_\_  
26 <sup>13</sup> These December 8, 2010, late revisions are also available at the web address cited in footnote 11 for materials  
released on November 24.

27 <sup>14</sup> See November Redline Tentative Permit, pp. F-77 to F-78, F-80, F-81, F-77 to F-79.

28 <sup>15</sup> 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.

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

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

### 15 **III. REQUEST FOR CONSIDERATION OF SUPPLEMENTAL EVIDENCE**

#### 16 **A. Scope of the District’s Request For Consideration of Supplemental Evidence**

17 In accordance with section 2050.6 of Title 23 of the California Code of Regulations, the  
 18 District requests that the State Board take official notice of, and consider.<sup>19</sup>

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

22 \_\_\_\_\_  
 23 <sup>16</sup> See November Redline Tentative Permit, pp. F-71 to F-72; November Redline Tentative TSO, pp. 1-2, 5.

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

<sup>18</sup> Hearing Transcript, pp. 462:13-463:9.

<sup>19</sup> 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.

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

3 **B. Support For the Request**

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

6 The memorandum provided as Exhibit C was delivered to the Regional Board and parties  
7 on December 9, 2010, and the District requested that it be included in the record. The request  
8 was denied.<sup>20</sup>

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

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

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

27 <sup>20</sup> Hearing Transcript, pp. 5:19-6:24.

28 <sup>21</sup> 40 C.F.R. § 124.17(a)(2).

<sup>22</sup> District's October 2010 Comments and Evidence Letter, p. 146.

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

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

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

#### 19 IV. COST CONSIDERATIONS

20 The Permit references various estimates pertaining to the cost of compliance with Permit  
 21 provisions. Cost is relevant for several reasons. It is relevant to the Regional Board's overall  
 22 obligation to act reasonably under Water Code sections 13000 and 13001. Cost is relevant to the  
 23 Permit requirements for tertiary filtration under Water Code section 13241.<sup>25</sup> It is relevant to  
 24

25 <sup>23</sup> See Hearing Transcript, pp. 5:19-24, 6:3-11.

26 <sup>24</sup> It was not announced until December 8, 2010, that a sufficient number of Regional Board members would be in  
 27 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.

28 <sup>25</sup> See section V, below.

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

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

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

17 Carollo prepared various reports and analyses regarding treatment alternatives and costs  
 18 for the SRWTP, including costs of implementing technologies and compliance with potential  
 19 permit terms.<sup>29</sup> Among these, and a product that also updated and incorporated results of prior  
 20 work,<sup>30</sup> was a Technical Memorandum Prepared in March 2009, titled, "Advanced Treatment  
 21  
 22

23 <sup>26</sup> See sections VI, VII, IX, below.

24 <sup>27</sup> See section VIII, below.

25 <sup>28</sup> Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal, [Written] Testimony/Comments of  
 26 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.

27 <sup>29</sup> McDonald Written Testimony, pp. 1-3; Hearing Transcript, pp. 168:23-169:15.

28 <sup>30</sup> McDonald Written Testimony, pp. 3-4.

1 Alternatives for the SRWTP” (2009 Treatment Alternatives Technical Memo).<sup>31</sup> The  
 2 2009 Treatment Alternatives Technical Memo evaluated five different treatment “trains” that  
 3 could be applicable in different scenarios, depending on potential future requirements that could  
 4 be imposed, and their cost.<sup>32</sup> The 2009 Treatment Alternatives Technical Memo was based on an  
 5 assumed permitted flow of 218 mgd ADWF. Accordingly, in August 2010 (subsequent to the  
 6 District’s withdrawal of its request for increased permitted flow), Carollo modified the cost  
 7 estimates to be consistent with a permitted flow of 181 mgd.<sup>33</sup>

8 The Permit requires full nitrification for ammonia removal, denitrification for nitrate  
 9 removal, and filtration. The applicable<sup>34</sup> treatment train developed by Carollo is a treatment train  
 10 involving:

11 a. Microfiltration and disinfection to meet filtration requirements. The planning level  
 12 estimate of project costs is \$1.2 billion if existing chlorine disinfection is used, and \$1.3 billion if  
 13 ultraviolet disinfection (UV) is used. The planning level estimate of increased operation and  
 14 maintenance (O&M) costs is \$44 million per year (if chlorine is used) and \$46 million (if UV is  
 15 used).<sup>35</sup>

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

20 \_\_\_\_\_  
 21 <sup>31</sup> This document is included within a larger document in the record titled, “Analysis of Costs and Benefits of  
 22 Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant,” completed by Larry  
 23 Walker Associates. (See McDonald Written Testimony, p. 1.)

24 <sup>32</sup> McDonald Written Testimony, pp. 3-4; Hearing Transcript, p. 169:4-15.

25 <sup>33</sup> See McDonald Written Testimony, p. 4. The August 19, 2010, project memorandum is titled, “Modification of  
 26 Flow basis for treatment train costs as previously presented in the ‘Advanced Treatment Alternatives for the  
 27 Sacramento Regional Wastewater Treatment Plant’ ” (Carollo, March 2009). It was supplemented by a  
 28 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.

<sup>34</sup> Technical analyses are presented in the various reports and testimony.

<sup>35</sup> McDonald Written Testimony, p. 5; Hearing Transcript, p. 172:8-16.

<sup>36</sup> McDonald Written Testimony, p. 5.

1 greater.<sup>37</sup> Also, the Permit as adopted creates the potential that the District would be required to  
 2 implement “interim” ammonia reduction.<sup>38</sup> There has been no evaluation of potential added (or  
 3 stranded) costs associated with meeting revised interim ammonia limits that could arise under the  
 4 Permit.<sup>39</sup>

5 c. NTFs followed by Fluidized Bed Reactors (FBR) to meet nitrate limitations. The  
 6 planning level project cost is \$780 million, with increased annual O&M costs of approximately  
 7 \$31 million per year.<sup>40</sup>

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

15  
 16 <sup>37</sup> McDonald Written Testimony, p. 5; Hearing Transcript, pp. 169:25-170:2; [Written] Testimony/Comments of  
 17 Denny S. Parker Related to Draft Waste Discharge Requirements for the Sacramento Regional Wastewater  
 18 Treatment Plant Tentative Order of the California Regional Water Quality Control Board, Central Valley Region,  
 19 September 3, 2010 (Parker Written Testimony), p. 5.

20 <sup>38</sup> Permit, p. 26.

21 <sup>39</sup> Hearing Transcript, p. 170:2-3; SRCSD Hearing Exhibits, PowerPoint slide 8.

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

28 <sup>41</sup> Permit, pp. F-79, F-97; Staff Response to Comments, pp. 5-10; Staff Report, pp. 38-40.

<sup>42</sup> 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).

<sup>43</sup> 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).

1 same cost estimating basis as Carollo, the Water Agency's planning level project estimate for  
2 nitrification and denitrification is greater than Carollo's.<sup>44</sup>

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

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

20 <sup>44</sup> Hearing Transcript, pp. 170:10-174:14.

21 <sup>45</sup> McDonald Written Testimony, pp. 5-8 and attached Exhibits C and D thereto.

22 <sup>46</sup> 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.

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

24 <sup>48</sup> Hearing Transcript, pp. 172:17-174:11.

25 <sup>49</sup> McDonald Written Testimony, p. 5; Hearing Transcript, pp. 170:6-8, 174:12-14.

26 <sup>50</sup> As noted above, the Permit does not make specific findings as to the costs to comply with the Permit terms.  
27 However, as the District indicated at the Regional Board hearing, the District takes exception to certain discussion of  
28 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

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

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

---

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

23 <sup>51</sup> 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.

24 <sup>52</sup> SRCSD Hearing Exhibits, PowerPoint slide 44; see District’s October 2010 Comments and Evidence Letter,  
 pp. 64, 88

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

<sup>54</sup> See, e.g., Permit, p. F-97.

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

5 And I think these comparisons with others are extremely shallow. Our translation  
 6 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.

7 Many of the numbers sited [sic] for other rates and fees are different for possibly a  
 8 wide range of reasons. A true comparison must address several other factors.  
 9 How much of those other plants was actually funded by development when it was  
 in its hay day? Don't know.

10 How much was funded by grants? Many of the other plants did get grants to help  
 11 the situations, but we have not done as [sic] analysis of how much grant money  
 was in the comparisons before us today.

12 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.

13 What are the unfunded liabilities with these other utilities? Are they keeping up  
 14 the infrastructure and doing the maintenance and rehab? Or are some of these  
 15 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.

16 And we have to talk about the quality and longevity of the projects that were  
 17 constructed. Until we answer those questions, I find comparison to other utilities a  
 very hollow argument.<sup>55</sup>

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

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

26 <sup>55</sup> Hearing Transcript, pp. 224:4-225:7. The District also notes that the Permit states that other cities have constructed  
 27 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.

28 <sup>56</sup> See, e.g., Permit, p. F-96.

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

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

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

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

25 The District objects to, and requests changes to, the Permit's final effluent limitations for  
26 total coliform organisms (Permit § IV.A.1.g) and the related final effluent limitations for BOD  
27 and TSS (Permit § IV.A.1.a [Table 6]) and "operation" specifications for turbidity (Permit  
28 § VI.C.4.a) (all collectively referred to as "filtration" or "tertiary" requirements). The Permit's

1 total coliform requirements (2.2 Most Probable Number [MPN] per 100 mL as a 7-day median,  
 2 and as otherwise specified in the Permit) are based on Department of Public Health (DPH)  
 3 “Title 22” regulations that prescribe effluent quality for certain uses of recycled water “that has  
 4 been transported from the point of treatment or production to the point of use without an  
 5 intervening discharge to waters of the State.”<sup>57</sup> Specifically, under DPH regulations, the  
 6 “2.2 MPN” requirement applies where effluent is used directly for irrigation of “food crops,”  
 7 impoundments of recycled water for unrestricted recreation, and certain other uses.<sup>58</sup> The new  
 8 Permit limitations for BOD, TSS, and turbidity are coupled with the new total coliform  
 9 requirements, and represent limits that can be achieved with filtration technology.<sup>59</sup>

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

15 Order No. 5-00-188, the District’s predecessor permit, contained effluent limitations for  
 16 disinfection/pathogens as follows: 23 MPN/100mL as a median weekly average and  
 17 500 MPN/100mL as a daily maximum not to be exceeded in any consecutive two days.<sup>60</sup>  
 18 Limitations for BOD and TSS in Order No. 5-00-188 were based on applicable requirements of  
 19 the Clean Water Act (CWA).<sup>61</sup> The previous limits for total coliform, BOD, and TSS are  
 20 adequate and appropriate. The State Board should determine that the Permit’s filtration  
 21

22 <sup>57</sup> Cal. Code Regs., tit. 22, § 60301.200.

23 <sup>58</sup> Cal. Code Regs., tit. 22, §§ 60301.220, 60304(a)(1), (b), 60305.

24 <sup>59</sup> As characterized in the Permit, the new BOD and TSS requirements are “based on tertiary treatment.” (Permit,  
 25 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  
 26 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.”

27 <sup>60</sup> Order No. 5-00-188, pp. 13-14 and fn. 4.

28 <sup>61</sup> 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].)

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

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

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

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

19 In waters designated for contact recreation (REC-1), the fecal coliform  
 20 concentration based on a minimum of not less than five samples for any 30-day  
 21 period shall not exceed a geometric mean of 200/100 ml, nor shall more than  
 22 ten percent of the total number of samples taken during any 30-day period exceed  
 23 400/100 ml.<sup>65</sup>

23 <sup>62</sup> See Disinfection Alternative No. 1, Sacramento County Sanitation District [sic], Sacramento Regional Wastewater  
 24 Treatment Plant, Proposed Waste Discharge Requirements and Time Schedule Order (NPDES No. CA0077682);  
 25 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.)

26 <sup>63</sup> See, e.g., Permit, pp. F-77, F-78 to F-79, F-80, F-97.

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

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

1 Section IV.C.3.d.xx(a) of the Permit Fact Sheet<sup>66</sup> purports to address the pathogens  
 2 “WQO,” but does not mention this WQO or *any* WQO at all. The section merely states that the  
 3 Regional Board desires to require “an equivalent level of treatment” to the level that applies for  
 4 unrestricted re-use of water.<sup>67</sup> “2.2 MPN,” for example, is not a WQO for the Sacramento River.  
 5 Nor does the Regional Board find that 2.2 MPN is a WQO “reasonably required” to protect  
 6 beneficial uses of the lower Sacramento River and Delta<sup>68</sup> or a water quality condition “that could  
 7 reasonably be achieved”<sup>69</sup> in ambient waters. Similarly, the “RPA Results” section related to  
 8 pathogens<sup>70</sup> does not consider whether the discharge has reasonable potential to cause or  
 9 contribute to exceedances of a WQO. The “RPA Results” section is only, again, a superficial  
 10 argument for the level of treatment applicable to certain direct re-use. As discussed above, the  
 11 DPH regulations prescribe effluent quality for “use of recycled water that has been transported  
 12 from the point of treatment or production to the point of use *without an intervening discharge to*  
 13 *waters of the State.*”<sup>71</sup> There is no such use here. Setting aside the lack of direct use, the Permit  
 14 does not acknowledge that there are other Title 22 reclamation criteria, including 23 MPN per  
 15 100 mL, applicable to specific uses.<sup>72</sup> Instead, it implies that the only Title 22 criteria that exist  
 16 are the requirements for tertiary effluent, which apply to recycled water that comes into direct  
 17 contact with “food crops” or is impounded for unrestricted recreation.<sup>73</sup> In the instant case, these  
 18 circumstances are not present or remotely close to present. The reclamation regulations thus have  
 19 no application or relevance here. In summary, the Permit does not present any analysis to support  
 20 a WQBEL implementing any discernible WQO.

---

21  
 22  
 23 <sup>66</sup> Permit, pp. F-72 to F-73.

24 <sup>67</sup> Permit, p. F-73.

25 <sup>68</sup> Wat. Code, § 13263(a).

26 <sup>69</sup> Wat. Code, § 13241(c).

27 <sup>70</sup> Permit, pp. F-73 to F-78.

28 <sup>71</sup> Cal. Code Regs., tit. 22, § 60301.200, emphasis added.

<sup>72</sup> See, e.g., Cal. Code Regs., tit. 22, §§ 60304(b) & (d), 60301.225.

<sup>73</sup> Cal. Code Regs., tit. 22, §§ 60304(a)(1), 60305.

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

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

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

18 Daily dilution of the SRWTP effluent is always greater than 20:1, and ordinarily it is  
 19 considerably greater. It is not disputed that the average dilution of the SRWTP effluent is  
 20 over 50:1.<sup>76</sup> Further, had the District been discharging at its *full* permitted flow during the period  
 21  
 22  
 23

---

24 <sup>74</sup> District's 2010 October Comments and Evidence Letter, p. 7. The District does not dispute that the Regional  
 25 Board *can* in appropriate circumstances issue WQBELs, including WQBELs more stringent than necessary to  
 26 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.

27 <sup>75</sup> Letter dated July 1, 2003, to Thomas R. Pinkos, Executive Officer, RWQCB, from David P. Spath, Chief, Division  
 of Drinking Water and Environmental Management.

28 <sup>76</sup> See Staff Report, p. 30; see also District's October 2010 Comments and Evidence Letter, pp. 8, 12; Permit, p. F-38.

1 January 1, 1998, through January 1, 2010, there would have been zero days with average dilution  
2 less than 20:1.<sup>77</sup>

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

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

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

21 The Regional Board has conformed its permitting practice to the 20:1 guideline.  
22 The District has reviewed 56 recent Region 5 permits, including 22 from 2007,  
23 19 from 2008, 10 from 2009, and 5 from 2010. A list of the reviewed permits is  
24 enclosed. Thirty-three permits found less than 20:1 dilution, and 18 found more  
25 than 20:1 dilution. Of the permits allowing less than 20:1 dilution, all contained  
26 total coliform effluent limits of 2.2 MPN/100 mL as a 7-day median. Of the  
27 18 allowing more than 20:1 dilution, 16 contained total coliform effluent limits of  
28 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.<sup>79</sup>

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.

79 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."

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

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

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

21 <sup>80</sup> District's October 2010 Comments and Evidence Letter, pp. 12-13, fn. \* in original.

22 <sup>81</sup> Permit, p. F-9; see Staff Report, p. 40; Staff Response to Comments, pp. 5, 40.

23 <sup>82</sup> See Order No. R5-2008-0154 (City of Stockton), pp. 31, F-38 to F-39; Order No. R5-2007-0113 (City of Lodi),  
 24 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  
 25 (City of Tracy), pp. 24, F-24, F-39 to F-40.

26 <sup>83</sup> See November Redline Tentative Permit, pp. F-77 to F-78; Permit, p. F-74.

27 <sup>84</sup> As discussed above, the District demonstrated that in 16 of 18 situations over a period in 2007-2010, the Regional  
 28 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.

1 than 20:1, suggesting the real threshold is not 20:1 but some other, unstated value.<sup>85</sup> It is  
 2 unsurprising that certain discharges to the Sacramento River downstream of Shasta Dam have  
 3 very high levels of dilution. This does not mean that the policy is something *other* than 20:1 for  
 4 the Sacramento River or anywhere else the policy applies. Indeed, there are examples of the  
 5 Regional Board finding much lower levels of dilution than the selected examples now cited in the  
 6 Permit, yet still not requiring filtration where 20:1 dilution exists.<sup>86</sup> In other words, “20:1” means  
 7 20:1, not some other number in terms of the dilution threshold employed by the Regional Board.

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

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

14 **1. February 2010 Risk Assessment Report**

15 While the 20:1 dilution policy remains highly relevant, it is correct that Regional Board  
 16 staff also sought a recommendation from DPH with regard to disinfection.<sup>87</sup> Because

17 <sup>85</sup> See November Redline Tentative Permit, p. F-78; Permit, p. F-74.

18 <sup>86</sup> For recent examples, see, e.g., Order Nos. R5-2010-0073 (Sewerage Commission-Oroville); R5-2010-0019 (City  
 19 of Chico); R5-2009-0078 (Chester Public Utility District); R5-2009-0007 (San Andreas Sanitary District);  
 20 R5-2008-0179 (Town of Discovery Bay CSD); R5-2008-0162 (Tuolumne Utilities District); R5-2007-0134 (City of  
 21 Yuba City); R5-2007-0098 (Tehama CSD #1); R5-2007-0069 (El Dorado Irrigation District); R5-2007-0056 (City of  
 22 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.)

23 <sup>87</sup> 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  
 24 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  
 25 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  
 26 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:

27 The reference within the Tentative Permit on pages F-73 and F-74 [of the September Tentative  
 28 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

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

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

---

17 Permit states that, '[C]entral Valley Water Board staff requested guidance on whether Dr. Emerick's  
 18 research that the Discharger's effluent had high (20) percent of coliform associated particles could be  
 19 underestimating the pathogenic risk of the discharge.' The focus of the study was on UV disinfection  
 20 of particle-associated coliform bacteria. The researchers collected effluent samples prior to  
 21 disinfection from several locations in California, including SRWTP. One component of the study  
 22 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.

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

25 <sup>89</sup> See [Written] Testimony/Comments of Charles P. Gerba, Ph.D., Related to Draft NPDES Permit for the  
 26 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.

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

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

1 The analysis relied upon standard microbial risk assessment methods.<sup>92</sup> The analysis calculated  
 2 risks of illness based on compiled ambient water quality data from four locations: Veteran's  
 3 Bridge, which is 8 miles upstream of the SRWTP discharge; Freeport (sometimes referred to as  
 4 "Freeport Marina"), which is immediately upstream of the discharge; Cliff's Marina, which is  
 5 approximately 0.5 miles downstream of the discharge; and River Mile 44, which is approximately  
 6 1.5 miles downstream of the discharge. It also calculated risk of a 20:1 blend of upstream river  
 7 water and effluent, a condition hypothetically assumed to exist at all times in the assessment.<sup>93</sup>

8 The report compared these risks to acceptable risk levels identified by U.S. EPA in  
 9 U.S. EPA's "Ambient Water Quality Criteria."<sup>94</sup> This U.S. EPA acceptable risk level is  
 10 8 illnesses per 1000 bathers/swimmers.<sup>95</sup> The report also notes that in the case of recreational  
 11 waters, risk of illness is used rather than risk of infection. Forty to fifty percent of persons  
 12 infected actually experience gastrointestinal illness.<sup>96</sup>

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

19 \_\_\_\_\_  
 20 <sup>92</sup> Gerba Written Testimony, p. 1.

21 <sup>93</sup> February 2010 Risk Assessment Report, pp. 3-5; Hearing Transcript, pp. 211:12-18, 213:21-214:1; SRCSD  
 22 Hearing Exhibits, PowerPoint slides 37-39. As water moves further downstream, potential impacts attributable to the  
 23 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.

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

25 <sup>95</sup> U.S. EPA Recreation Criteria Document, p. 9; Hearing Transcript, p. 210:21-25. As was pointed out by DPH, the  
 26 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.

27 <sup>96</sup> February 2010 Risk Assessment Report, p. 9; Hearing Transcript, p. 209:5-7.

28 <sup>97</sup> February 2010 Risk Assessment Report, p. 7; Hearing Transcript, p. 212:6-12.

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

3 In addition, although the U.S. EPA acceptable or recommended risk levels are based on  
4 one swimming or bathing exposure (also referred to as swimming activity day), the February  
5 2010 Risk Assessment Report calculates risk from both one day of swimming activity and  
6 ten days of swimming activity.<sup>99</sup>

7 Also, the February 2010 Risk Assessment Report assumed that each individual swallows  
8 100 mL of water during a day of swimming activity. This is *two to sixteen times greater* than  
9 amounts typically used in such risk assessments. U.S. EPA studies indicate that 37 mL is a more  
10 appropriate value for a day of swimming. Nonetheless, the 100 mL assumption was applied  
11 throughout, unquestionably representing another very conservative assumption.<sup>100</sup>

12 The resultant risk calculations are generally reflected in Tables 3-5 of the February  
13 2010 Risk Assessment Report. Thus, for example, referencing Table 4 and using the applicable  
14 conservative assumptions, the calculated average risk of illness from ingesting *Cryptosporidium*  
15 for a swimmer at Veteran's Bridge is  $1.20 \times 10^{-5}$  (or, 1.2 in 100,000), and at River Mile 44 it is  
16  $1.27 \times 10^{-5}$  (or, 1.27 in 100,000).

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

21  
22  
23  
24  
25 <sup>98</sup> February 2010 Risk Assessment Report, p. 7; Gerba Written Testimony, p. 3; Hearing Transcript, p. 212:15-18.

26 <sup>99</sup> Gerba Written Testimony, p. 2; Hearing Transcript, p. 212:18-19; SRCSD Hearing Exhibits, PowerPoint slide 34.

27 <sup>100</sup> February 2010 Risk Assessment Report, p. 8; Gerba Written Testimony, p. 2; Hearing Transcript, pp. 212:20-  
28 213:2.

<sup>101</sup> February 2010 Risk Assessment Report, p. 10; Hearing Transcript, p. 211:18-20; SRCSD Hearing Exhibits,  
PowerPoint slide 33.

1           **2. Letter From DPH and Response**

2           DPH wrote to Regional Board staff on June 15, 2010, after review of the February 2010  
3 Risk Assessment Report.<sup>102</sup> DPH pointed out (not specifically referencing, but presumably using,  
4 Table 5 on p. 16 of the February 2010 Risk Assessment Report) that the calculated risk of illness  
5 reflected for swimmers was on average 1.3 per 10,000 at Veteran's Bridge (upstream), 1.2 per  
6 10,000 at Freeport (upstream), 1.8 per 10,000 at Cliff's Marina (.5 mile downstream), and 3.4 per  
7 10,000 at River Mile 44 (1.5 miles downstream).<sup>103</sup> The "bottom line" recommendation in the  
8 DPH letter was that SRCSD's effluent not cause an additional risk of infection greater than  
9 1 in 10,000.<sup>104</sup>

10           In a letter of June 30, 2010, the District responded to the DPH letter, noting the extremely  
11 conservative nature of the DPH recommendation, the high cost of filtration, and the fact that the  
12 February 2010 Risk Assessment Report used extremely conservative assumptions. The District  
13 also pointed out that even with all the conservative assumptions, the difference at .5 miles  
14 downstream was not statistically significant, and while the difference at 1.5 miles downstream  
15 was statistically significant, the value may be influenced by different factors such as the marina or  
16 other inflows. In addition, there were certain misstatements in the DPH letter that required  
17 clarification or correction. The District also noted that, even though the risk level  
18 recommendation proposed by DPH was extremely conservative, the level could be met if just one  
19 of the conservative assumptions were more realistic.<sup>105</sup> In written testimony subsequently  
20 submitted in October, Dr. Gerba explicitly agreed with the District's communications in this  
21

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

24           <sup>103</sup> DPH June 2010 Letter, p. 2.

25           <sup>104</sup> DPH June 2010 Letter, p. 3.

26           <sup>105</sup> See Letter dated June 30, 2010, to Ken Landau, RWQCB, from Stan Dean, SRCSD, Subject: California  
27 Department of Public Health letter dated June 15, 2010 (District's June 2010 Letter), pp. 2-4; see also Letter dated  
28 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.

1 regard as related to the microbial risk analysis, in addition to addressing additional topics  
2 discussed below.<sup>106</sup>

### 3 3. Permit Discussion of February Report

4 The Permit contains severe mischaracterizations or misunderstandings regarding the  
5 February 2010 Risk Assessment Report. Further, the Permit *does not address at all* Dr. Gerba's  
6 written testimony or testimony at the hearing. Nor has anyone disputed Dr. Gerba's analysis or  
7 testimony, a fact that undercuts much of the discussion in the Permit. The District addresses,  
8 immediately below, the Permit findings and related material that pertain only to the February  
9 2010 Risk Assessment Report. Thereafter, in section V.C.4 below, the District discusses  
10 Dr. Gerba's subsequent testimony and the Regional Board's failure to consider that evidence  
11 at all.

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

21 <sup>106</sup> Gerba Written Testimony, p. 2.

22 <sup>107</sup> November Redline Tentative Permit, p. F-80; Permit, pp. F-76 to F-77.

23 <sup>108</sup> November Redline Tentative Permit, p. F-80; Permit, p. F-76.

24 <sup>109</sup> See Gerba Written Testimony, p. 2 ("The USEPA 1986 standards apply to all surface recreational waters  
25 regardless if they are directly influenced by treated wastewater or not."); U.S. EPA Recreation Criteria Document,  
26 p. 3 (U.S. EPA criteria based on studies whose goals included "to determine if swimming in sewage-contaminated  
27 water carries a health risk for bathers"); U.S. EPA Recreation Criteria Document, p. 5 ("[T]he association of illness  
28 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.

<sup>110</sup> 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

1 The risk levels from the U.S. EPA Recreation Criteria Document have been used in recent  
 2 U.S. EPA regulations adopting *regulatory* criteria for various states. In 2000, Congress passed  
 3 the Beaches Environmental Assessment and Coastal Health Act of 2000 (Pub.L. No. 106-284  
 4 (Oct. 10, 2000) 114 Stat. 870) (BEACH Act) which required states to adopt either the U.S. EPA  
 5 1986 Criteria or criteria “as protective” as the U.S. EPA recommendation. The U.S. EPA’s  
 6 2004 Water Quality Standards for Coastal and Great Lakes Recreation Waters promulgated water  
 7 quality criteria for the remaining states that had not yet adopted protective criteria, putting in  
 8 place regulatory criteria corresponding to an illness rate of 0.8% for swimmers (the U.S. EPA  
 9 criteria value) in freshwater.<sup>111</sup>

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

22  
 23  
 24 indicator bacteria in waters that are associated with acceptable health risks for swimmers.” Further on in the  
 25 document, it is stated that U.S. EPA’s evaluation of bacteriological data indicated that using their recommended  
 26 indicator levels would cause an estimated 8 illnesses per 1000 swimmers at freshwater beaches. (U.S. EPA  
 27 Recreation Criteria Document, p. 9.) The document notes that those relationships are approximate, but states:  
 28 “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.)

<sup>111</sup> 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[.]”).

<sup>112</sup> November Redline Tentative Permit, p. F-80; Permit, p. F-77.

1 lower than the acceptable risk level used by U.S. EPA and many states.<sup>113</sup> The risk associated  
2 with the SRCSD discharge is simply not what is suggested by the finding.<sup>114</sup>

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

16 Regional Board staff presentation at the hearing cited a “1.5 to 3.7” increase in risk and  
17 referred to a “doubling” of risk, from one unidentified value to another unidentified value.<sup>117</sup>  
18 Staff also referred to extreme and non-representative conditions not even analyzed in the  
19 February 2010 Risk Assessment Report and for which there is thus no technical analysis. These  
20 characterizations suffer from the same deficiencies noted above, including the failure to consider  
21

---

22 <sup>113</sup> The referenced statement in the Permit is confusing, given that the U.S. EPA recreation criteria are based on a  
23 linkage of gastroenteritis and swimming in wastewater-influenced waters, and subsequent determination of an  
24 indicator bacteria concentration which will be protective of human health. The criteria are based on a risk of illness  
25 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.)

26 <sup>114</sup> See also discussion in section V.C.4.

27 <sup>115</sup> Permit, p. F-95.

28 <sup>116</sup> See Staff Report, pp. 24-25.

<sup>117</sup> Hearing Transcript, p. 94:3-20.

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

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

#### 9 4. Additional Evidence Entirely Ignored in the Permit

10 In addition to other comments and evidence submitted concerning the September  
 11 Tentative Permit, in October, the District transmitted written testimony of Dr. Gerba.<sup>121</sup> In his  
 12 written testimony and testimony at the Regional Board hearing, Dr. Gerba described the  
 13 preparation and outcomes of the February 2010 Risk Assessment Report. He expressed his  
 14  
 15

---

16 <sup>118</sup> Mr. Landau, Regional Board Assistant Executive Officer: "In closing, filtration. First, there was a discrepancy in  
 17 the data I was putting on Power Point slides versus the districts. That was my mistake. I had actually grabbed an  
 18 earlier version of the report. The parasite data is the same, but the health risks numbers were somewhat different."  
 19 (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.)

20 <sup>119</sup> For example, the District's June 2010 Letter (p. 4) included the observations that reasonable assumptions "would  
 21 result in a projected risk of infection of less than 1 in 10,000 in the Sacramento River downstream from the SRWTP  
 22 discharge." The District strongly takes issue with the Staff Report's discussion of this reality. Specifically, the Staff  
 23 Report appears to insist that all assumptions be treated as District-created true facts, and that the District should not  
 24 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.

25 In this regard, the September Tentative Permit (p. F-75) recognized realities and included a statement that "it is  
 26 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.)

27 <sup>120</sup> Section V.C.4, *infra*.

28 <sup>121</sup> Gerba Written Testimony; Hearing Transcript, p. 208:14-18.

1 conclusion that the “SRWTP discharge does not result in a meaningful increase in risk to  
2 recreationists of waterborne disease.”<sup>122</sup>

3 In addition, Dr. Gerba explained that, since completion of the February 2010 Risk  
4 Assessment Report, he had also considered the effect of current SRWTP disinfection practices on  
5 the viability of *Giardia* cysts: “The impact of chlorination on the discharge from the [SRWTP]  
6 was not considered in the [February 2010 Risk Assessment Report’s] assessment of *Giardia*  
7 viability. *Giardia* is much more susceptible to inactivation by free chlorine and chloramines than  
8 *Cryptosporidium*[.]”<sup>123</sup>

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

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

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

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

25 <sup>122</sup> Gerba Written Testimony, p. 5; see Hearing Transcript, p. 215:14-19.

26 <sup>123</sup> Gerba Written Testimony, p. 3, emphasis added; see also Hearing Transcript, p. 215:14-19; SRCSD Hearing Exhibits, PowerPoint slide 40.

27 <sup>124</sup> Gerba Written Testimony, pp. 3-5.

28 <sup>125</sup> District’s October 2010 Comments and Evidence Letter, p. 11, citation omitted.

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

7 The data related to in-river risk from *Cryptosporidium* are in Table 4 of the February  
 8 2010 Risk Assessment Report, and are depicted on PowerPoint slides 38 and 39 of  
 9 SRCSD's Hearing Exhibits. The calculated risks for a swimming day are:

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

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

## 16 5. Summary of Evidence

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

25 <sup>126</sup> Hearing Transcript, pp. 213:16-19, 215:14-16, 221:8-20.

26 <sup>127</sup> 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.")

27 <sup>128</sup> 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.")

28 <sup>129</sup> See section V.D, *infra*.

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

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

5 **and**

6 **Increased risk of illness from *Cryptosporidium* contributed by the SRWTP is much**  
7 **less than 1 in 100,000.<sup>130</sup>**

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

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

14 The September Tentative Permit proposed filtration requirements.<sup>131</sup> Such requirements  
15 are, obviously, more stringent than necessary to implement any adopted WQO.

16 Water Code section 13241 provides:

17 Each regional board shall establish such water quality objectives in water  
18 quality control plans as in its judgment will ensure the reasonable protection of  
19 beneficial uses and the prevention of nuisance; however, it is recognized that it  
20 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:

- 21 (a) Past, present, and probable future beneficial uses of water.  
22 (b) Environmental characteristics of the hydrographic unit under  
23 consideration, including the quality of water available thereto.  
24 (c) Water quality conditions that could reasonably be achieved through the  
coordinated control of all factors which affect water quality in the area.  
25 (d) Economic considerations.  
26 (e) The need for developing housing within the region.  
27 (f) The need to develop and use recycled water.

28 <sup>130</sup> 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.

<sup>131</sup> September Tentative Permit, p. 33.

1 The Chief Counsel of the State Board, in a memorandum interpreting this provision, has  
 2 explained the Regional Board's affirmative duty to develop and consider information on the  
 3 section 13241 factors and engage in a "balancing" of factors to develop objectives consistent with  
 4 the statute.<sup>132</sup>

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

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

22 \_\_\_\_\_  
 23 <sup>132</sup> 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).

24 <sup>133</sup> *In the Matter of the Petition of City and County of San Francisco, et al.*, State Board Order No. WQ 95-4  
 25 (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.

26 <sup>134</sup> *In the Matter of the Petition of the Cities of Palo Alto, Sunnyvale and San Jose*, State Board Order No. WQ 94-8  
 27 (Sept. 22, 1994), p. 11.

28 <sup>135</sup> *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.

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

8 The September Tentative Permit, however, made no reference at all to the Regional  
 9 Board’s obligations under Water Code sections 13263(a) and 13241 with respect to the proposed  
 10 filtration requirements. In its comments on the September Tentative Permit, the District pointed  
 11 out this glaring deficiency.<sup>138</sup>

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

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

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

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

28 <sup>138</sup> District’s October 2010 Comments and Evidence Letter, pp. 6-7.

<sup>139</sup> 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.)

<sup>140</sup> Permit, p. F-77.

<sup>141</sup> See, e.g., Wat. Code, §§ 13000, 13001, 13241, 13263(a).

1           **1. Water Code Section 13263(a)**

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

6           **2. Water Code Section 13241**

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

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

26 \_\_\_\_\_  
27 <sup>142</sup> See Permit, pp. F-74 to F-75.

28 <sup>143</sup> 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.

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

3 Modeling (calibrated and validated with multiple dye studies) has shown that up to  
4 700 feet downstream of the discharge, no effluent (diluted or undiluted) is present in the river  
5 within approximately 100 feet of either riverbank. Typically, dilution is far greater than 20:1. At  
6 Harmonic Mean Flows, the river:effluent flow ratio is 56:1 for 181 mgd of effluent flow. At  
7 critical low river flows as represented by the lowest 7-day average flow expected to occur once in  
8 ten-years (7Q10) (i.e., 5820 cfs), dilution is 21:1 at a discharge rate of 181 mgd. River flows as  
9 low as the 7Q10 occur infrequently. Between 1970 and 2009, river flow was at or below 5820 cfs  
10 approximately 0.58 percent of the time.<sup>144</sup> In short, there is no evidence of any appreciable risk  
11 related to irrigation of food (or other crops) that would necessitate filtration.

12 Regional Board staff also requested that the District conduct the recreational user risk  
13 assessment described previously. As the Permit recites, contact recreation is considered the most  
14 sensitive use, such that, if it is protected, other beneficial uses will be protected.<sup>145</sup> However, the  
15 revised November Tentative Permit and Permit as adopted<sup>146</sup> also include generalized reference to  
16 Municipal (MUN) use. There is no evidence of any risk or any meaningful effect on risk to  
17 consumers of water of any kind; nor did DPH itself or anyone else identify any such risk as a  
18 concern. The nearest drinking water intake is the Barker Slough Pumping Plant, which is  
19 approximately 40 miles downstream of the discharge.<sup>147</sup> The California Urban Water Agencies  
20 (CUWA) stated that pathogens from the SRWTP “are not currently impacting drinking water  
21

22 <sup>144</sup> District’s October 2010 Comments and Evidence Letter, p. 8.

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

25 <sup>146</sup> November Redline Tentative Permit, p. F-77; Permit, p. F-78.

26 <sup>147</sup> Permit, p. F-36. As stated in the District’s October 2010 Comments and Evidence Letter and reflected in the  
27 record: *Giardia* and *Cryptosporidium* are not detected frequently in State Water Project waters according to the 2006  
28 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)].)

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

8 In this regard, the District certainly concurs that the Regional Board should regulate for  
 9 the reasonable protection of the REC-1 use. However, it is of little relevance to say that the  
 10 Sacramento River and Sacramento-San Joaquin Delta supports 12 million recreational user days  
 11 per year.<sup>151</sup> This number greatly overstates the use of the lower Sacramento River below the  
 12 SRWTP discharge. In addition, non-contact recreational use such as hiking, sightseeing,  
 13 birdwatching, and any other recreational activities distant from the immediate receiving water are  
 14 not pertinent to the issue of impacts associated with the SRWTP discharge. Risk calculations  
 15 referred to in the February 2010 Risk Assessment Report and Permit are based on a day of  
 16 swimming. Risks associated with fishing and boating are much lower.<sup>152</sup> And, any effect on risk  
 17 that could be attributable to the SRWTP diminishes as water moves downstream due to fate and  
 18 transport processes and any additions of flow from other sources.<sup>153</sup> Again, the District does not  
 19 dispute that downstream waters should have protection of REC-1 beneficial use consistent with  
 20

21 <sup>148</sup> California Urban Water Agencies’ February 1, 2010, Letter to K. Harder, *Comments on Issue Paper on NPDES*  
 22 *Permitting Renewal Issues Drinking Water Supply and Public Health for the Sacramento Regional Wastewater*  
 23 *Treatment Plant*, p. 2.

24 <sup>149</sup> Letter dated February 1, 2010, to Kathy Harder, RWQCB, from Walter Wadlow, Alameda County Water District,  
 25 et al., re: Comments on Drinking Water Supply and Public Health Issues Concerning the Sacramento Regional  
 26 Wastewater Treatment Plant NPDES Permit Renewal (Wadlow Letter), p. 15. Both CUWA as cited in the preceding  
 27 footnote and the individual contractors in the Wadlow Letter advocated filtration for increases in discharge above  
 28 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.

<sup>150</sup> November Redline Tentative Permit, p. F-77; Permit, p. F-78.

<sup>151</sup> Permit, p. F-95.

<sup>152</sup> Gerba Written Testimony, pp. 2-3.

<sup>153</sup> Gerba Written Testimony, p. 3.

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

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

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

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

25 \_\_\_\_\_  
 26 <sup>154</sup> 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.”

27 <sup>155</sup> Permit, p. F-79.

28 <sup>156</sup> Permit, p. F-79.

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

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

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

13 This finding borders on the absurd. There is no evidence whatsoever that any such prohibitions—  
 14 which have never occurred—will occur, let alone any evidence of economic impacts. The  
 15 “finding” regarding section 13241(d) also merely recites a range of estimates of capital costs to  
 16 SRCSD and its ratepayers of filtration, without any specific finding or consideration of  
 17 consequences, reinforcing that the consideration of costs is perfunctory.<sup>159</sup> This finding and  
 18 another Permit finding also state that tertiary filtration for pathogens may also reduce  
 19 concentrations of other pollutants.<sup>160</sup> There is no finding of any meaningful change in water  
 20 quality that results with respect to other pollutants. In fact, the Permit actually ignores evidence  
 21 that reductions in other pollutants from filtration would result in an immeasurable or *de minimus*  
 22 change in ambient water quality. For example, the Permit vaguely states that filtration “will”  
 23 reduce total organic carbon (TOC), without suggesting how much or whether there would be any  
 24

25 \_\_\_\_\_  
<sup>157</sup> Permit, p. F-77.

26 <sup>158</sup> Permit, pp. F-77 to F-78.

27 <sup>159</sup> 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”).

28 <sup>160</sup> Permit, pp. F-77, F-79 to F-80.

1 meaningful benefit. There is uncontroverted evidence in the record that the effects on water  
2 quality would be insignificant.<sup>161</sup>

3 The District stated in comments:

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

16 Indeed, the Staff Response to Comments acknowledges that the “additional benefits” of  
17 filtration identified in the Permit, whatever they may be, are “not reasons for requiring the level  
18 of treatment.”<sup>163</sup>

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

23 <sup>161</sup> For example, incremental reduction in TOC concentrations resulting from advanced treatment technologies  
24 (including filtration) were specifically evaluated and modeled, and are reflected on pages 4-38 and 4-39  
25 (Figures 4-16 and 4-17) of Technical Memorandum: Analysis of Costs and Benefits of Advanced Treatment  
26 Alternatives for the Sacramento Regional Wastewater Treatment Plant (Larry Walker Associates, May 2010). In  
27 those figures, Train A and Train C include filtration. Trains D and E include also reverse osmosis to varying degree.  
28 (*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.

<sup>162</sup> District’s October 2010 Comments and Evidence Letter, p. 16.

<sup>163</sup> 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.

<sup>164</sup> 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

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

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

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

24 No. CA0077682) and Time Schedule Order for Sacramento Regional County Sanitation District (SRCSD),  
 25 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  
 26 driving up the cost of housing through increased connection fees and users charges which directly affect the cost of  
 living in a house”).

27 <sup>165</sup> Permit, p. F-80.

28 <sup>166</sup> Permit, p. F-80.

<sup>167</sup> Permit, p. F-80.

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

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

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

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

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

<sup>168</sup> District's October 2010 Comments and Evidence Letter, p. 15.

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

<sup>170</sup> Hearing Transcript, p. 174:8-10.

<sup>171</sup> District's October 2010 Comments and Evidence Letter, p. 15.

1 **E. Best Practicable Treatment or Control (BPTC)**

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

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

25  
 26  
 27 \_\_\_\_\_  
 28 <sup>172</sup> 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.

1 **F. Conclusion Regarding Filtration**

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

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

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

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

23 <sup>173</sup> Permit, p. 14.

24 <sup>174</sup> Permit, pp. F-54, F-57.

25 <sup>175</sup> Permit, pp. F-55 to F-57.

26 <sup>176</sup> See state's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and*  
 27 *Estuaries of California* (SIP), pp. 5-6; see, e.g., Order No. R5-2007-0036 (City of Tracy), p. F-30; Order  
 28 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).

<sup>177</sup> Permit, pp. F-54 to F-55.

1 zones are proper based on studies and information submitted by the discharger and the  
 2 availability of assimilative capacity.<sup>178</sup> When it determines that mixing zones are proper, the  
 3 Regional Board then calculates effluent limitations based on applicable regulations and  
 4 procedures and with consideration of dilution.<sup>179</sup>

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

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

20 Ultimately, the Permit takes a shotgun approach to the denial of mixing zones for  
 21 ammonia, citing 11 reasons why dilution credits are denied.<sup>182</sup> The reasons are deeply flawed on

22 <sup>178</sup> SIP, pp. 15-18; Basin Plan, p. IV-16.00.

23 <sup>179</sup> SIP, p. 8; see, e.g., Order No. R5-2010-0073 (Sewerage Commission-Oroville Region), p. F-29; Order  
 24 No. R5-2010-0044 (Shasta County Service Area No. 17), p. F-25.

25 <sup>180</sup> See, e.g., Staff Report, p. 13 (“If only USEPA’s recommended water quality criteria for ammonia are considered,  
 26 there is sufficient flow and assimilative capacity to allow mixing zones for compliance.”).

27 <sup>181</sup> Permit, pp. F-40 to F-41; Staff Report, p. 7, 16.

28 <sup>182</sup> 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.

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

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

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

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

19 **1. Purpose of Mixing Zones**

20 A mixing zone is generally defined as, “[a]n area where an effluent discharge undergoes  
 21 initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A  
 22 mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as  
 23

24 <sup>183</sup> *Topanga Assn. for a Scenic Community v. County of Los Angeles* (1974) 11 Cal.3d 506, 515 (*Topanga*); see  
 25 *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.

26 <sup>184</sup> *Topanga, supra*, 11 Cal.3d, pp. 514-515.

27 <sup>185</sup> Subsection B below.

28 <sup>186</sup> Subsection A below.

<sup>187</sup> Subsections C, D below.

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

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

18 **2. The Regional Board’s Denial Based on the SIP Is Unrelated to Acute and**  
 19 **Chronic Mixing Zones**<sup>193</sup>

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

22 \_\_\_\_\_  
 23 <sup>188</sup> U.S. EPA *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001)  
 (March 1991) (TSD), p. glossary XX.

24 <sup>189</sup> Permit, p. A-4.

25 <sup>190</sup> 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; . . .”).

26 <sup>191</sup> Permit, pp. F-28 to F-30.

27 <sup>192</sup> 2000 Final FED for the SIP, p. V-45; see also Basin Plan, p. IV-16.00; TSD, pp: 33-34.

28 <sup>193</sup> 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.

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

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

18 Further, while the granting of a mixing zone is within the Regional Board’s discretion,  
 19 denial of mixing zones may not be arbitrary and the Regional Board must consider all information  
 20 in the record, the cost to the discharger, and lack of harm *associated with such a mixing zone*.<sup>200</sup>

21 <sup>194</sup> September Tentative Permit, pp. F-54 to F-56.

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

26 <sup>196</sup> See November Redline Tentative Permit, pp. F-40 to F-41, F-58 to F-54; Permit, p. F-27.

27 <sup>197</sup> SIP, p. 17.

28 <sup>198</sup> Permit, p. F-40.

<sup>199</sup> SIP, p. 17, underline omitted.

<sup>200</sup> *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,

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

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

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

---

23 and the lack of evidence of any harm associated with such a mixing zone."); see also *In the Matter of the Petitions of*  
 24 *East Bay Municipal Utility District and Bay Area Clean Water Agencies*, State Board Order WQO 2002-0012  
 25 (July 18, 2002), pp. 15-16 ("For example, if the background concentration were below water quality objectives, and  
 26 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.").

27 <sup>201</sup> See section VI.B, *post*.

28 <sup>202</sup> *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).

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

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

16 There exist in the Basin Plan narrative water quality objectives that relate to the type of  
 17 impacts alleged to occur from low concentrations of ammonia far downstream of the discharge.<sup>206</sup>

18  
 19 <sup>203</sup> 40 C.F.R. § 122.44(d)(1)(vi)(A).

20 <sup>204</sup> See, e.g., section VI.B.1.b.iii, *post*.

21 <sup>205</sup> Basin Plan, p. IV-17.00.

22 <sup>206</sup> Narrative objectives potentially implicated by the ammonia-related issues discussed in the Permit include:

23 **Biostimulatory Substances**

Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.

\* \* \*

24 **Chemical Constituents**

Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses . . . .

\* \* \*

25 **Toxicity**

26 All waters shall be maintained free of toxic substances in concentrations that produce detrimental  
 27 physiological responses in human, plant, animal, or aquatic life. This objective applies regardless  
 28 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.)

1 Again, setting aside shortcomings of technical analysis, the Regional Board simply skipped over  
2 its obligations related to implementation of narrative objectives.<sup>207</sup>

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

5 The District provided evidence to support an acute aquatic life mixing zone that extends  
6 60 feet downstream, and a chronic aquatic life mixing zone that extends 350 feet downstream.<sup>208</sup>

7 With respect to an acute aquatic life mixing zone, the Sacramento River is approximately 600 feet  
8 wide while the proposed mixing zone is only 300 feet wide (the width of the diffuser) by 60 feet  
9 downstream.<sup>209</sup> Further, the acute mixing zone begins along the bottom of the river at the sub-  
10 merged diffuser and would not reach the surface of the river.<sup>210</sup> In comparison, the Sacramento  
11 River extends over 40 miles downstream from the discharge to San Francisco Bay. The TSD  
12 states, “[i]f the total area affected by elevated concentrations within all mixing zones combined is  
13 small compared to the total area of a waterbody (such as a river segment), then mixing zones are  
14 likely to have little effect on the integrity of the waterbody as a whole, provided that they do not  
15 impinge on unique or critical habitats.”<sup>211</sup> Accordingly, because the combined mixing zones for  
16 the SRWTP’s discharge are small in comparison to the river segment, there is expected be little  
17 effect on the integrity of the water body as a whole (unlike, for example, granting a mixing zone  
18 in an EDW that occupies the entire water body). Thus, an acute aquatic life mixing zone would  
19 not compromise the integrity of the entire water body. Likewise, the chronic aquatic life mixing  
20 zone of 350 feet would also not compromise the integrity of the entire water body because the  
21 mixing zones combined are small in comparison to the river segment in question.

22 Under any circumstances, and as discussed further below, the Regional Board did not  
23 provide findings that ammonia (in contrast to the mixing zone) impairs the entirety of the  
24

25 <sup>207</sup> See, e.g., section VI.B.1.b.iii, *post*.

26 <sup>208</sup> Permit, pp. F-112, J-9; see also District’s October 2010 Comments and Evidence Letter, p. 80.

27 <sup>209</sup> District’s October 2010 Comments and Evidence Letter, p. 80.

28 <sup>210</sup> District’s October 2010 Comments and Evidence Letter, p. 80.

<sup>211</sup> TSD, p. 34.

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

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

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

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

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

26 <sup>212</sup> *Topanga, supra*, 11 Cal.3d, p. 515; see also State Board Order WQO 2004-0013, *supra*, p. 12.

27 <sup>213</sup> See Permit, pp. F-40 to F-41; see also Staff Report, p. 13.

28 <sup>214</sup> See, e.g., section VI.B.1.a (no toxicity to delta smelt); see also section VI.B.1.b (discussion on copepods).

<sup>215</sup> See section VI.B, *post*; see also State Board Order WQO 2004-0013, *supra*, p. 12.

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

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

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

25 \_\_\_\_\_  
 26 <sup>216</sup> See section VI.B.1, *post*; Permit, p. F-56, ¶¶ (1), (3), (4), (5), (6).

27 <sup>217</sup> See section VI.B.1, *post*.

28 <sup>218</sup> Staff Report, pp. 6, 13.

<sup>219</sup> See Permit, p. 24.

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

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

10 The Permit readily admits that acute and chronic aquatic life mixing zones comply with  
 11 the SIP and the Basin Plan), except for ammonia.<sup>220</sup> With respect to ammonia, as discussed  
 12 above, the Permit claims that the SIP is not satisfied because an acute mixing zone for ammonia  
 13 would: (1) compromise the integrity of the entire body; (2) adversely impact biologically  
 14 sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or  
 15 state endangered species laws; and (3) produce undesirable or nuisance aquatic life.<sup>221</sup>  
 16 Specifically, the Permit claims that these elements of the SIP have not been met "because  
 17 ammonia discharges from the Facility have been shown to be negatively affecting the receiving  
 18 water far downstream of the discharge within the Delta, not just the areas defined by the  
 19 requested mixing zone."<sup>222</sup> The Permit also includes ten other findings (which are supposedly  
 20 discussed in detail in Attachment J) as to why denying dilution credits for ammonia is  
 21 appropriate.<sup>223</sup> However, the findings in general and the information in Attachment J are not  
 22 supported by evidence in the record. Further, in some cases, the evidence allegedly relied on by  
 23 the Regional Board is not actually in the record and is not publicly available. Finally, as  
 24

25 \_\_\_\_\_  
 26 <sup>220</sup> Permit, pp. F-35 to F-38.

27 <sup>221</sup> Permit, p. F-40.

28 <sup>222</sup> Permit, pp. F-40 to F-41.

<sup>223</sup> Permit, pp. F-56 to F-57.

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

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

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

8 Over the last three years, a series of hypotheses has cropped up regarding  
9 ammonia's potential effects on aquatic life in the delta. Agencies and interested  
10 parties have energetically funded research addressing these hypotheses which has  
11 been repeatedly evaluated at workshops, by independent panels, and through  
12 various State and federal processes that are currently underway.

13 As detailed in the district's comments, none of the independent reviews have  
14 revealed a consensus that ammonia is a key driver of ecological problems in the  
15 delta, including the pelagic organism decline. This slide [SRCSD Hearing  
16 Exhibits, powerpoint slide 17] condenses some of the key points about ammonia  
17 contained in my testimony and in the district's comments. It illustrates a pattern of  
18 investigation that re-enforces the importance of distinguishing between hypothesis  
19 and facts. Several hypotheses asserted as facts a short time ago in some circles are  
20 no longer supported by available information from the delta.<sup>224</sup>

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

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

28 <sup>224</sup> 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.)

<sup>225</sup> See District's October 2010 Comments and Evidence Letter, pp. 16-38.

<sup>226</sup> 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.

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

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

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

25  
 26  
 27 <sup>227</sup> Engle Written Testimony, p. 4; Hearing Transcript, pp. 188:13-193:5; SRCSD Hearing Exhibits, PowerPoint  
 slides 17-19.

28 <sup>228</sup> Permit, p. F-56.

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

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

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

21 The U.S. EPA acute criterion for ammonia that applies to water bodies with salmonids  
 22 present was specifically derived to protect rainbow trout.<sup>232</sup> Because repeated rounds of testing  
 23

24 <sup>229</sup> Permit, p. J-1.

25 <sup>230</sup> See Permit, p. J-2; see also Staff Response to Comments, p. 20 (“Central Valley Water Board staff concur that  
 26 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.

27 <sup>231</sup> District’s October 2010 Comments and Evidence Letter, p. 23; Engle Written Testimony, p. 4.

28 <sup>232</sup> 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).

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

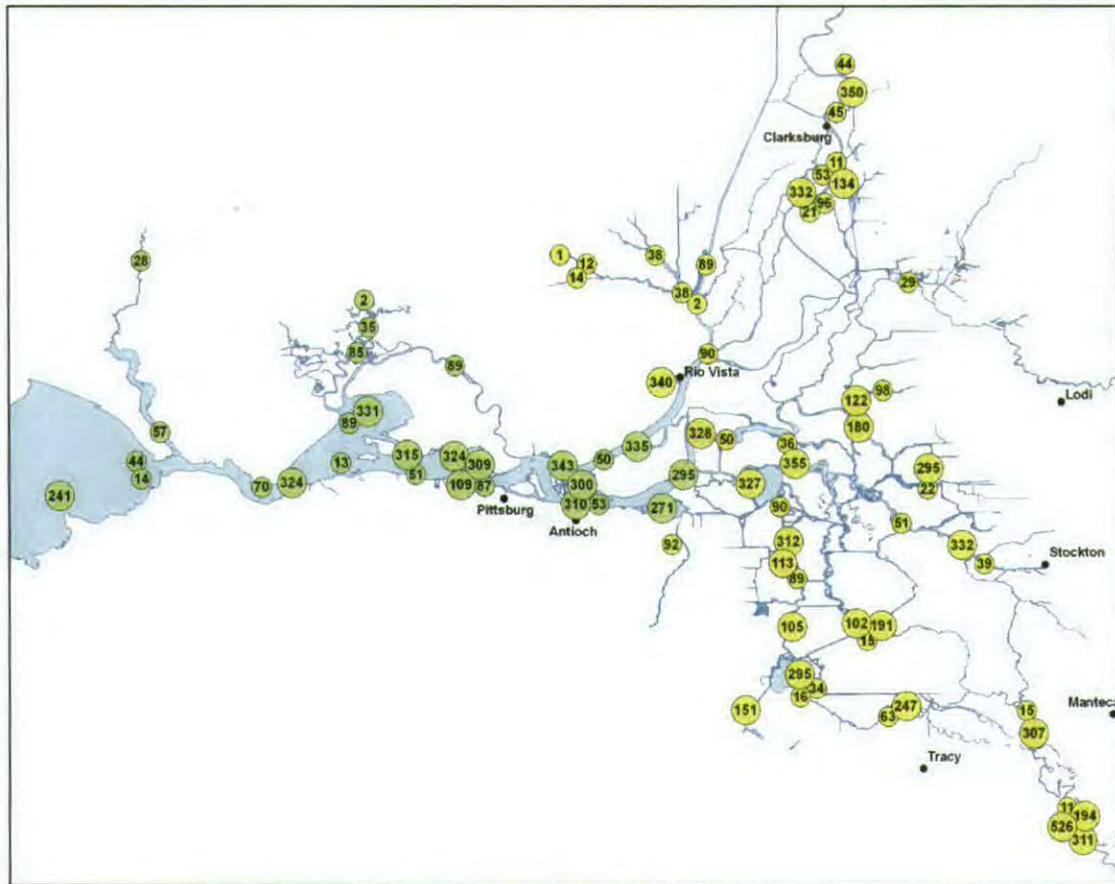
- 6 • Engle<sup>234</sup> compared U.S. EPA acute and chronic criteria with ambient ammonia  
 7 concentrations from almost 12,000 grab samples taken throughout the freshwater and  
 8 brackish estuary from 1974 to the present. The dataset included monitoring results  
 9 from the Interagency Ecological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

23 <sup>233</sup> 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).

24 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).

26 <sup>234</sup> 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).

28 <sup>235</sup> See Figure 1 (Map of monitoring locations and samples taken at each monitoring location).



**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.<sup>236</sup>

- Regional Board staff conducted ambient water sampling at 21 sites in the freshwater Delta between March 2009, and February 2010.<sup>237</sup> 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.<sup>238</sup> Although such use of an ACR of 20.7 conflicts

<sup>236</sup> Engle 2010a.

<sup>237</sup> 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).

<sup>238</sup> See U.S. EPA 1999.

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

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

18 \_\_\_\_\_  
 19 <sup>239</sup> U.S. EPA used the geometric mean of all three available ACRs (20.7, 9.7, 6.5) to characterize the acute:chronic  
 20 sensitivity of fathead minnow (*Pimephales*), not the highest of the available ACRs (20.7). This was done because  
 21 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  
 22 resulting Genus Mean ACR (GMACR) for fathead minnow is 10.86.

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

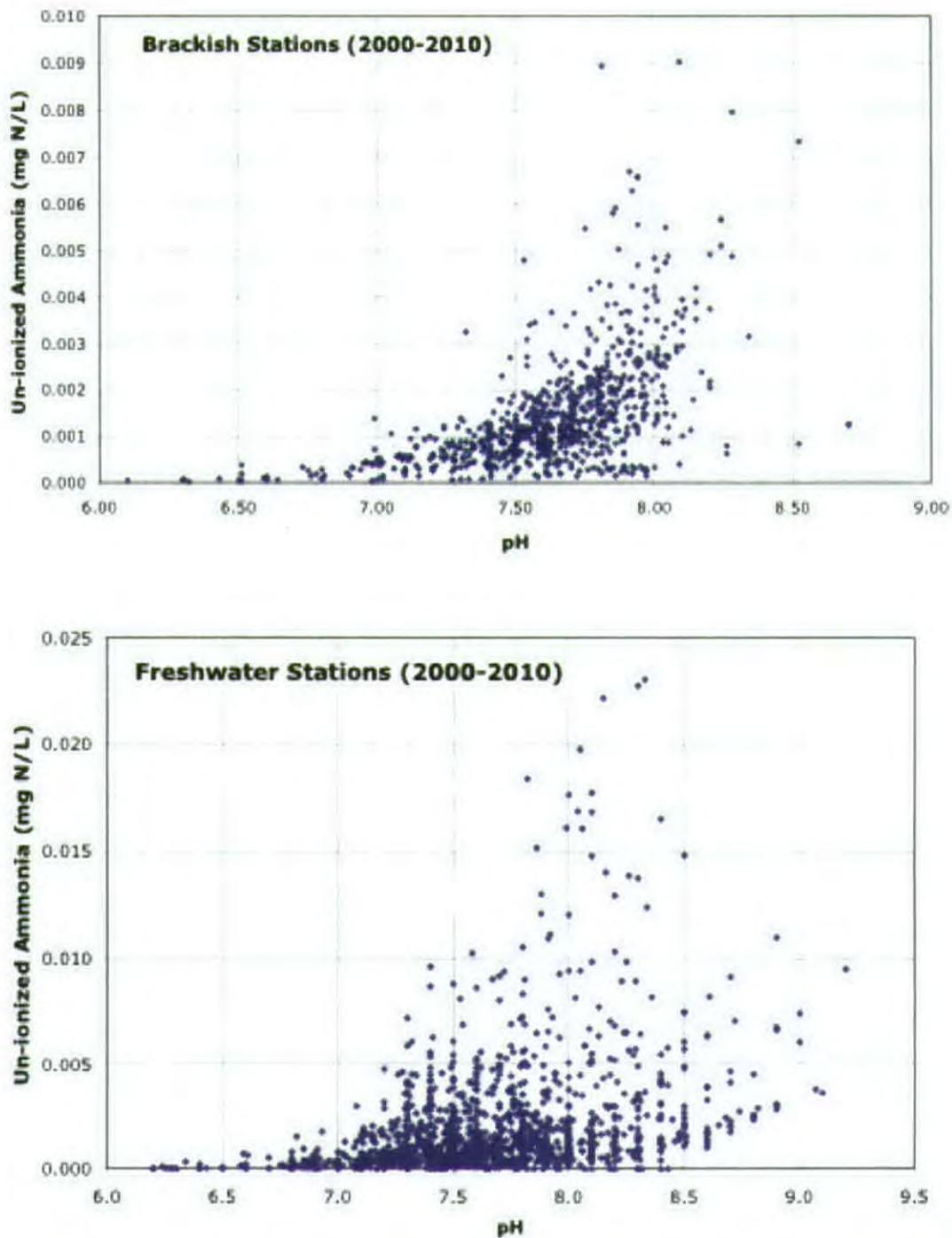
28 <sup>241</sup> Werner et al. 2008; Werner et al. 2009.

<sup>242</sup> Permit, p. J-2.

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

<sup>244</sup> 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).

<sup>245</sup> See Figure 2.



23 **Figure 2.** Relationship between field pH and un-ionized ammonia (mg N/L) at brackish stations (upper panel)  
 24 (Sherman Island to San Pablo Bay) and at freshwater stations (lower panel) in the upper SFE during 2000-2010.  
 25 Dataset is described in Engle & Lau 2010<sup>246</sup>. 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.

26  
 27 <sup>246</sup> Engle, D.L., and G. Lau. 2010. Does Ammonia Exceed Toxicity Thresholds in the Upper San Francisco Estuary?  
 28 A Comparison of Ambient Data and Toxicity Thresholds for 1974-2010. Interagency Ecological Program (IEP)  
 Annual Workshop, Sacramento, CA (Engle & Lau 2010).

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

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

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

22  
 23  
 24 <sup>247</sup> LC10 is the concentration at which it is estimated there is 10 percent mortality.

25 <sup>248</sup> Werner et al. 2009.

26 <sup>249</sup> Ultimately, the Permit findings do not express concurrence with this suggestion. (See Permit, p. J-2.) It is in any  
 27 event erroneous, as discussed above.

28 <sup>250</sup> Permit, p. J-2.

<sup>251</sup> Permit, pp. J-2 to J-3.

<sup>252</sup> See section VI.B.1.b.iv, *post*.

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.<sup>253</sup> 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.<sup>254</sup> 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.<sup>255</sup> 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.<sup>256</sup>

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.<sup>257</sup> 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.<sup>258</sup> Further, the LC10s are higher than the

<sup>253</sup> 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).

<sup>254</sup> Permit, p. J-2.

<sup>255</sup> 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).

<sup>256</sup> Foe 2009, p. 2, emphasis added.

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

<sup>258</sup> Foe et al. 2010.

1 99.91 percentile of ammonia concentrations occurring 350 feet below the SRWTP diffuser.<sup>259</sup> In  
 2 other words, ambient concentrations of total ammonia in the Sacramento River essentially never  
 3 exceed the lowest acute thresholds (LC10s) thus far reported for *E. affinis* or *P. forbesi* for  
 4 representative pH conditions.

5 With respect to the rest of the Delta, there is also no relevant evidence supporting a claim  
 6 of acute toxicity for *E. affinis* or *P. forbesi*. None of the ambient total ammonia values measured  
 7 by the Regional Board at 24 sites throughout the Delta exceeded the environmentally relevant  
 8 LC10s for these two copepod species during 16 field surveys conducted 2009-2010, and most  
 9 ambient concentrations were more than an order of magnitude lower than the LC10s.<sup>260</sup> When  
 10 expressed as *un-ionized* ammonia, the environmentally relevant LC10s for the two copepod  
 11 species (0.08 mg N/L un-ionized ammonia for both species at pH 7.6)<sup>261</sup> are well above the  
 12 99<sup>th</sup> percentile (i.e., 0.014 mg N/L un-ionized ammonia) of measured ambient concentrations of  
 13 for the freshwater Delta for 2000-2010.<sup>262</sup> None of the Regional Board's measurements of total  
 14 ammonia in the Delta during 2009-2010<sup>263</sup> exceeded the preliminary 96-hour Lowest Observed  
 15 Effects Concentration (LOEC) for 3-day old nauplii of *P. forbesi* (1.23 mg N/L total ammonia)  
 16 reported in a November 10, 2010, letter from Dr. Teh to Dr. Foe referenced in the Permit.<sup>264</sup> Only  
 17 one of the ambient un-ionized ammonia measurements in the more extensive dataset illustrated in  
 18 Figure 3 exceeds the nauplii LOEC when it too is expressed as un-ionized ammonia (0.03 mg N/L  
 19 un-ionized ammonia at reported test conditions of pH 7.8 and temperature 20°C). Thus, when  
 20 acute effects thresholds for environmentally representative pH values are compared to ambient  
 21  
 22

23 <sup>259</sup> Anti-Degradation Analysis for Proposed Discharge Modification to the Sacramento Regional Wastewater  
 24 Treatment Plant, Draft, Larry Walker Associates (May 20, 2009) (Expansion ADA).

25 <sup>260</sup> Foe et al. 2010.

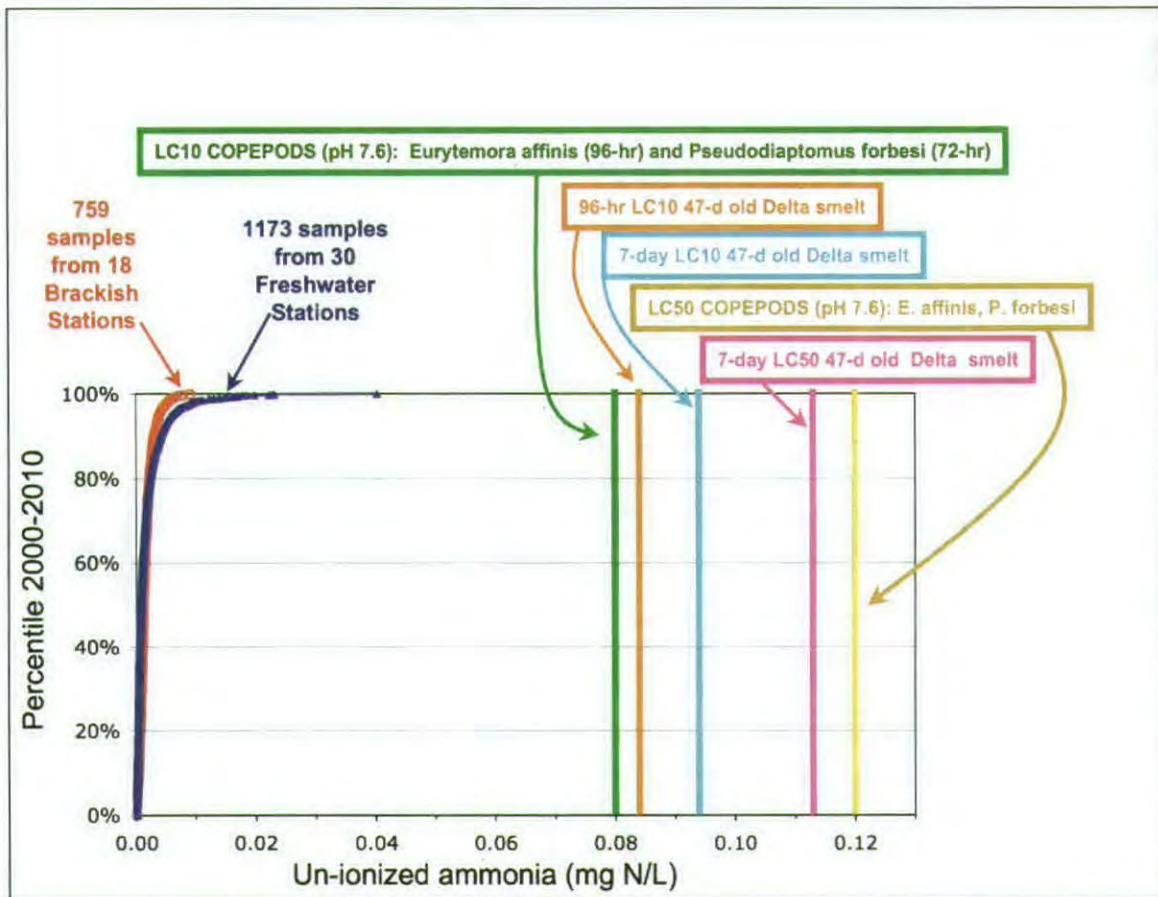
26 <sup>261</sup> Teh et al. 2009.

27 <sup>262</sup> See also Figure 3; Teh et al. 2009.

28 <sup>263</sup> Foe et al. 2010.

<sup>264</sup> 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).

1 ammonia concentrations in the Delta, there is no evidence of acute toxicity to the most sensitive  
2 Delta species.<sup>265</sup>



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

26 <sup>265</sup> District's October 2010 Comments and Evidence Letter, p. 37; Engle Written Testimony, p. 4; Hearing Transcript,  
p. 188:6-12.

27 <sup>266</sup> Permit, J-7.

28 <sup>267</sup> Figure 3 in Engle 2010a was adapted by adding the LC10 and LC50 for *P. forbesi* from Teh et al. 2009.



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

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

### 18 iii. Effect Levels From Preliminary Studies Are Inappropriate 19 Water Quality Criteria

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

23 \_\_\_\_\_  
24 <sup>275</sup> The EC20 is a calculated effect level indicating the concentration of a parameter causing a 20 percent reduction in  
25 a measured effect compared to the control or reference condition. The measured effect is typically sublethal, such as  
26 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).

27 <sup>276</sup> 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).

28 <sup>277</sup> District's October 2010 Comments and Evidence Letter, p. 38; Engle Written Testimony, p. 4.

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

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

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

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

25 <sup>278</sup> 40 C.F.R. § 122.44(d)(1)(vi)(A).

26 <sup>279</sup> Basin Plan, p. IV-17.00.

27 <sup>280</sup> Basin Plan, p. IV-17.00.

28 <sup>281</sup> Hearing Transcript, pp. 192:20-193:5; 194:12-14; SRCSD Hearing Exhibits, PowerPoint slide 19;  
Teh et al. 2010.

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

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

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

23 <sup>282</sup> Permit, p. J-2.

24 <sup>283</sup> See section VI.B.1.b.i, *supra*.

25 <sup>284</sup> See sections VI.B.1.b.ii, iii, *supra*.

26 <sup>285</sup> Permit, p. J-2.

27 <sup>286</sup> See sections VI.B.1.b.ii, iii, *supra*.

28 <sup>287</sup> Hearing Transcript, p. 411:4-6.

<sup>288</sup> See Permit, p. F-56.

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

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

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

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

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

23 <sup>289</sup> Hearing Transcript, p. 197:14-17 ("... some of the staff think that the effluent limits that are in your tentative  
 24 permit are the right limits for the wrong reason.")

25 <sup>290</sup> Permit, p. F-57.

26 <sup>291</sup> Hearing Transcript, pp. 406:8-407:20.

27 <sup>292</sup> The District lodged various other objections at the hearing, and all were overruled. The District takes exception to  
 28 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.

<sup>293</sup> Permit, p. J-2.

1 September Tentative Permit and the District provided comment and evidence regarding this  
2 statement.<sup>294</sup>

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

14 Government Code section 11513(d) provides: “Hearsay evidence may be used for the  
15 purpose of supplementing or explaining other evidence but over timely objection shall not be  
16 sufficient in itself to support a finding unless it would be admissible over objection in civil  
17 actions.” The November Teh Letter is cited as the sole basis for what “additional experiments”  
18

19 <sup>294</sup> September Tentative Permit, p. K-3; see, e.g., District’s October 2010 Comments and Evidence Letter, p. 38.

20 <sup>295</sup> September Tentative Permit, p. K-3.

21 <sup>296</sup> See November Redline Tentative Permit, p. J-3. The full text as revised, and the text which should be stricken  
22 based on the District’s objection, is as follows:

23 Dr. Teh completed additional experiments and confirmed the *P. forbesi* findings. Dr. Teh concluded  
24 *P. forbesi* is more sensitive to total ammonia nitrogen at lower pH and the ionized fraction is more  
25 toxic than unionized fraction of ammonia to *P. forbesi*. The Low Observed Effect Concentration  
26 (LOEC) of 0.36 mg/L from chronic 31-day study indicated total ammonia at environmentally  
27 relevant concentrations of 0.3 to 0.6 mg/L as seen in the Cache Slough regions may pose significant  
28 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.)

<sup>297</sup> November Redline Tentative Permit, p. J-3; Permit, p. J-3; November Teh Letter.

<sup>298</sup> November Teh Letter, p. 1.

<sup>299</sup> November Teh Letter, p. 4.

1 purportedly show, and the Permit relates the content of the letter as findings.<sup>300</sup> This is classic  
 2 hearsay and improper. The Regional Board should not have considered this evidence in adopting  
 3 the Permit.

4 Hearsay evidence is “evidence of a statement that was made other than by a witness while  
 5 testifying at the hearing and that is offered to prove the truth of the matter stated.”<sup>301</sup>

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

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

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

23 <sup>300</sup> Permit, p. F-56.

24 <sup>301</sup> Evid. Code, § 1200(a).

25 <sup>302</sup> Hearing Transcript, pp. 406:8-407:5, 407:16-18.

26 <sup>303</sup> Hearing Transcript, p. 407:18-20.

27 <sup>304</sup> Hearing Transcript, p. 409:2-7.

28 <sup>305</sup> See Hearing Transcript, pp. 409:2-411:1.

<sup>306</sup> Hearing Transcript, p. 411:4-6.

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

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

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

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

24 <sup>307</sup> Permit, p. J-5.

25 <sup>308</sup> Permit, pp. F-55 to F-56.

26 <sup>309</sup> Permit, p. F-55, Findings 3-5.

27 <sup>310</sup> Permit, p. J-5.

28 <sup>311</sup> Permit, p. J-5.

<sup>312</sup> Permit, p. J-5.

1 ammonia inhibition is a factor affecting aquatic life beneficial uses, or that ammonia reduction in  
 2 the SRWTP effluent to the levels required by the Permit would actually increase diatom biomass  
 3 in Suisun Bay.<sup>313</sup>

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

14 Currently, the hypothesized potential for increased diatom biomass in Suisun Bay related  
 15 to ammonia reduction is logically constrained to the April-May window when lower benthic  
 16 grazing rates (claim grazing), increased water temperature, density stratification, and other factors  
 17 occasionally provide windows for bloom development. However, historical evidence indicates  
 18 that the spring period (April-May) was not when the bulk of annual phytoplankton biomass  
 19 occurred in Suisun Bay.<sup>316</sup> Instead, prior to the arrival of the clam in 1987, June-September were  
 20

21 <sup>313</sup> See District's October 2010 Comments and Evidence Letter, pp. 25-26; Engle Written Testimony, p. 4.

22 <sup>314</sup> Alpine, A.E., and J.E. Cloern. 1992. Trophic interactions and direct physical effects control phytoplankton  
 23 biomass and production in an estuary. *Limnol. Oceanogr.* 37:946-955 (Alpine & Cloern 1992).

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

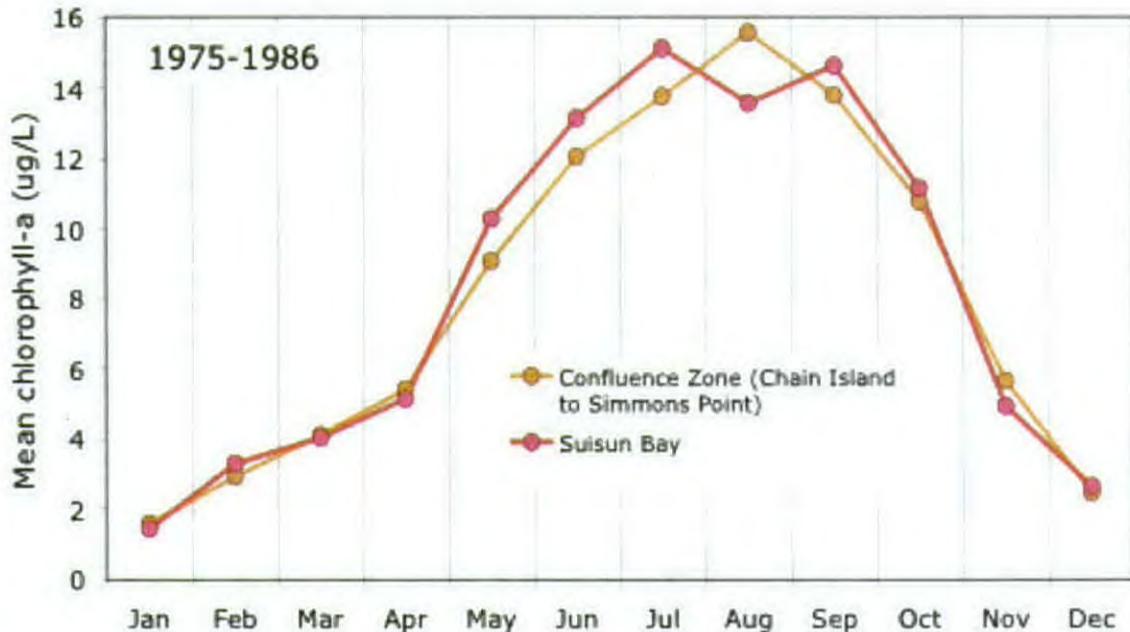
26 Kimmerer, W.J. 2005. Long-term changes in apparent uptake of silica in the San Francisco estuary. *Limnol*  
 27 *Oceanogr* 50:793-798 (Kimmerer 2005).

28 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).

<sup>315</sup> District's October 2010 Comments and Evidence Letter, p. 25; Engle Written Testimony, p. 4.

<sup>316</sup> SRCSD 2010.

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



5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28

**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.<sup>318</sup>

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

<sup>317</sup> See Figure 4.

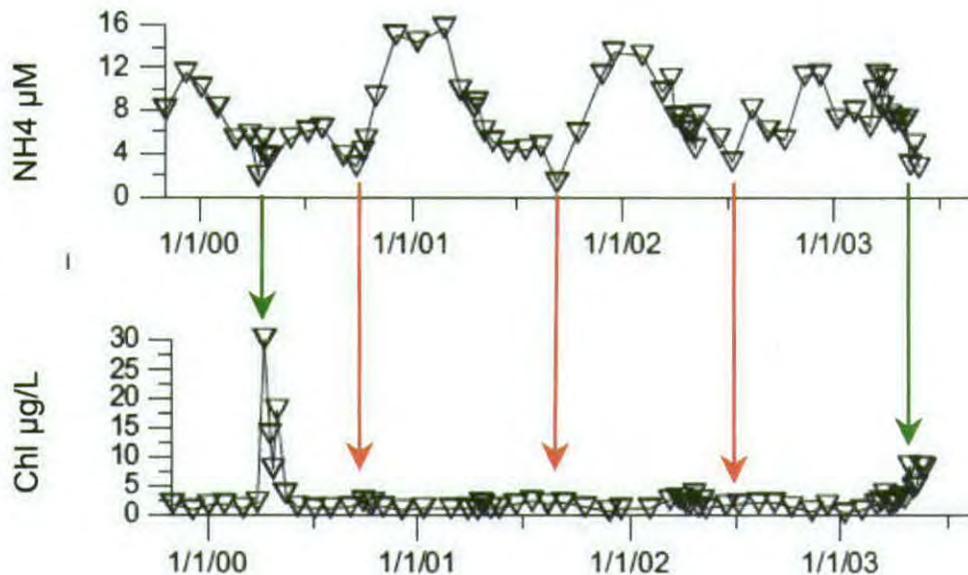
<sup>318</sup> SRCSD 2010.

<sup>319</sup> 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).

<sup>320</sup> 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).

<sup>321</sup> Permit, p. J-5.

1 publication regarding several environmental parameters (e.g., stratification, benthic grazing by  
 2 clams, zooplankton abundance, residence time, Delta outflow), which are important to the  
 3 determination of whether conditions are “favorable” for blooms.<sup>322</sup> In the time series presented in  
 4 Wilkerson et al. 2006 and Dugdale et al. 2007, algal blooms occurred in Suisun Bay only twice  
 5 out of five periods when ammonium concentrations fell below  $4 \mu\text{M}$ ,<sup>323</sup> and one of the blooms  
 6 (Spring 2003) failed to yield chlorophyll-a levels above  $10 \mu\text{g/L}$ —a level commonly referenced  
 7 as a threshold for nutritional adequacy for Delta zooplankton.



8  
 9  
 10  
 11  
 12  
 13  
 14  
 15  
 16  
 17  
 18  
 19  
 20  
 21  
**Figure 5.** Time series of ammonium and chlorophyll-a from Suisun Bay. Green arrows indicate where ammonium concentrations below a  $4 \mu\text{M}$  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.<sup>324</sup>

22  
 23  
 24  
 25  
 26  
<sup>322</sup> District’s October 2010 Comments and Evidence Letter, p. 26; Engle Written Testimony, p. 4.

27  
<sup>323</sup> See Figure 5.

28  
<sup>324</sup> SRCSD 2010.

1 This pattern amply illustrates that other factors frequently prevent blooms in Suisun Bay,  
 2 even when ammonium concentrations are below the “Dugdale threshold” of 4  $\mu\text{M}$ .<sup>325</sup> In fact,  
 3 with the documentation of drawdown of ammonium during the onset of blooms by Wilkerson  
 4 et al. 2006,<sup>326</sup> time series limited to measurements of ammonium and chlorophyll-a cannot rule  
 5 out the possibility that low ammonium concentrations *in situ* are the *result* of a bloom triggered  
 6 by non-nutrient factors, rather than the *cause*.

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

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

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

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

25 <sup>325</sup> District’s October 2010 Comments and Evidence Letter, p. 26; Engle Written Testimony, p. 4.

26 <sup>326</sup> Wilkerson et al. 2006.

27 <sup>327</sup> Permit, p. J-5; District’s October 2010 Comments and Evidence Letter, p. 26; Engle Written Testimony, p. 4.

28 <sup>328</sup> Permit, p. J-5.

<sup>329</sup> Permit, pp. J-1, J-5 to J-8.

1 Regional Board, and State Water Contractors. Unsubstantiated predictions include:

2 (1) chlorophyll-a production would be lower and slower in river water below the discharge  
 3 compared to above the discharge; (2) the SRWTP discharge would trigger a change in the relative  
 4 biomass of large (e.g., diatoms) versus small phytoplankton in the Sacramento River; (3) biomass  
 5 of phytoplankton would not increase in the river in reaches where ammonium uptake exceeded  
 6 nitrate uptake; and (4) ammonia concentrations would explain the occurrence of *Microcystis*, a  
 7 nuisance species. In addition, the Permit does not place ammonia-related hypotheses in context  
 8 with other well-regarded hypotheses for recent changes in the biomass or composition of  
 9 phytoplankton in the upper estuary.<sup>330</sup>

10 (a) **Ammonia Concentrations Above the Threshold of 4  $\mu\text{M}$   
 11 Have Been Shown to Stimulate Growth of N-Limited  
 12 Phytoplankton as They Enter the Delta in the  
 13 Sacramento River**

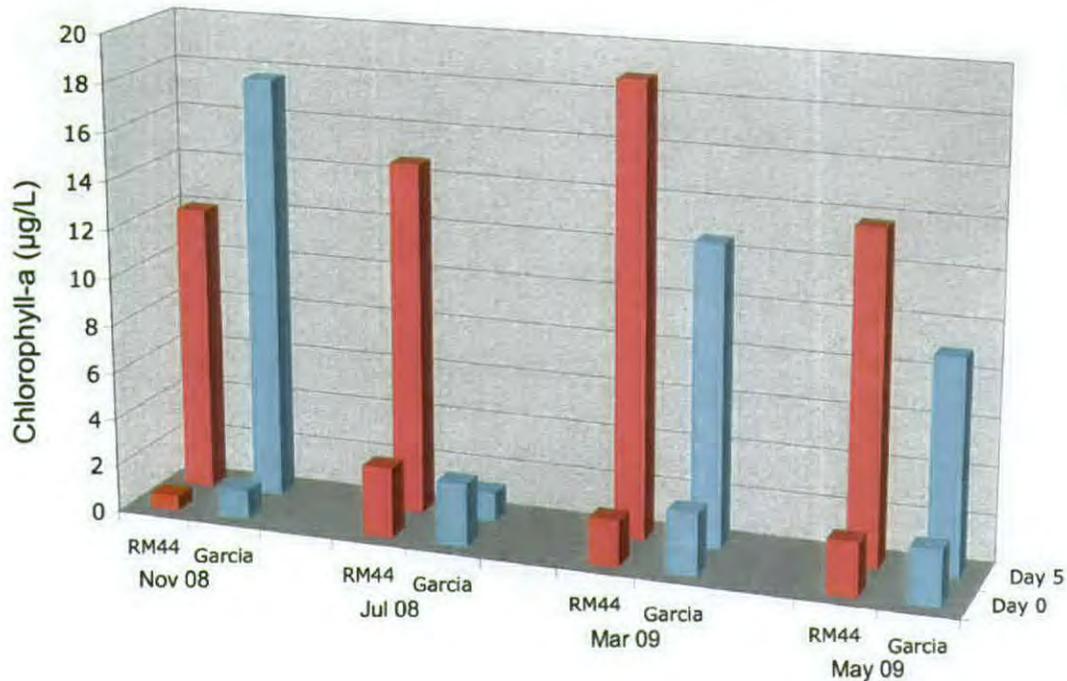
13 Five-day “grow-out” experiments were conducted by Parker et al. 2010<sup>331</sup> using water  
 14 collected above and below the SRWTP discharge in November 2008 and March and May 2009.  
 15 The grow-out experiments were intended to eliminate light limitation, but by design also  
 16 eliminate other environmental factors (e.g., settling and *in situ* grazing) that potentially affect  
 17 riverine phytoplankton biomass in transport through the Delta.<sup>332</sup> During three out of four of the  
 18 grow-out experiments, phytoplankton grew *better* in water collected at River Mile 44 below the  
 19 SRWTP discharge than they did in Sacramento River water collected above the discharge, even  
 20 though the ammonium concentrations at River Mile 44 were well above the Dugdale threshold of  
 21 4  $\mu\text{M}$ .<sup>333</sup>

22  
 23  
 24 <sup>330</sup> See Permit, pp. J-1 to J-8.

25 <sup>331</sup> 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).

26 <sup>332</sup> District’s October 2010 Comments and Evidence Letter, p. 27; Engle Written Testimony, p. 4.

27 <sup>333</sup> Ammonium concentrations in RM-44 water used in the grow-out experiments were: July 2008 - 9.06  $\mu\text{M}$ ;  
 28 November 2008 - 71.87  $\mu\text{M}$ ; March 2009 - 12.47  $\mu\text{M}$ ; May 2009 - 9.54  $\mu\text{M}$  (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  $\mu\text{M}$ ; November 2008 - 71.87  $\mu\text{M}$ ; March 2009 - 12.47  $\mu\text{M}$ ; May 2009 - 9.54  $\mu\text{M}$ . Data are from Tables 19-21 in Parker et al. 2010.<sup>334</sup>

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.<sup>335</sup> Based on these results, little evidence exists to attribute downstream decreases in chlorophyll-a observed in some field surveys in the Sacramento River to

<sup>334</sup> Parker et al. 2010.

<sup>335</sup> 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  $\text{NO}_3$  or  $\text{NH}_4$  in experiments conducted with water from GRC, or in the form of  $\text{NH}_4$  supplied in the wastewater effluent (at RM-44) to produce greater biomass.").

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

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

8 Additionally, the Permit finds mixing zones should be denied based on far field impacts to  
9 aquatic life beneficial uses associated with hypothesized shifts in algal communities.<sup>337</sup> However,  
10 substantial evidence and information exists to suggest otherwise.<sup>338</sup> Specifically, multiple  
11 longitudinal transects, measuring nutrients and algal biomass in the Sacramento River from above  
12 Sacramento (I-80 bridge) to Suisun Bay, were conducted by Regional Board staff in 2008-  
13 2010.<sup>339</sup> Both studies revealed that although chlorophyll-a often declines in the downstream  
14 direction from the I-80 bridge above Sacramento to Rio Vista, no step decline is associated with  
15 the SRWTP discharge.<sup>340</sup> For example, in the data shown in Figure 7, more phytoplankton  
16 biomass (green line) was lost from river water *above* the SWRTP discharge than below. Further,  
17 most of the decline in diatoms (blue bars) occurred *upstream* of the SRWTP—a field result which  
18 directly contradicts the ammonium-inhibition hypothesis for the lower Sacramento River portion  
19 of the freshwater Delta.

20 ///

21 ///

22 ///

23 ///

24 ///

25 ///

26 <sup>336</sup> District's October 2010 Comments and Evidence Letter, pp. 27-28; Engle Written Testimony, p. 4.

27 <sup>337</sup> Permit, pp. F-56, J-7.

28 <sup>338</sup> District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

<sup>339</sup> Foe et al. 2010, and Parker et al. 2009 and 2010.

<sup>340</sup> District's October 2010 Comments and Evidence Letter, p. 29; Engle Written Testimony, p. 4.

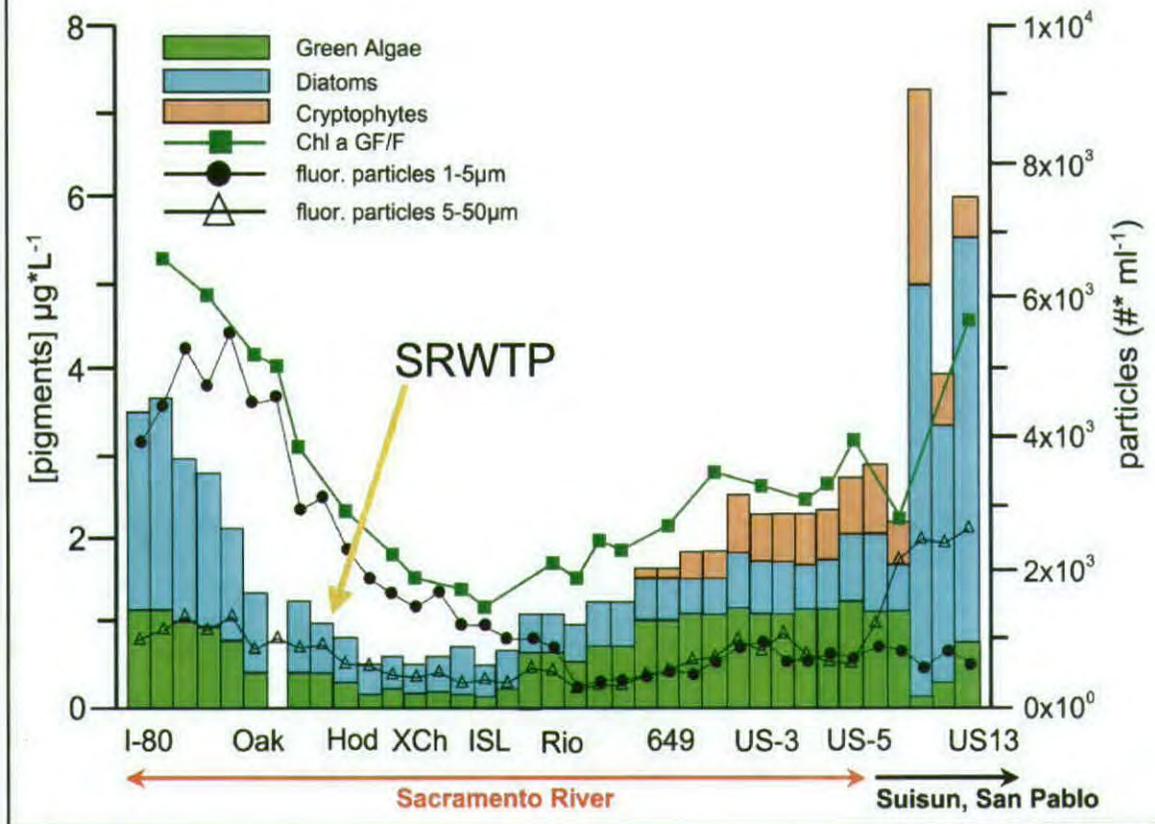
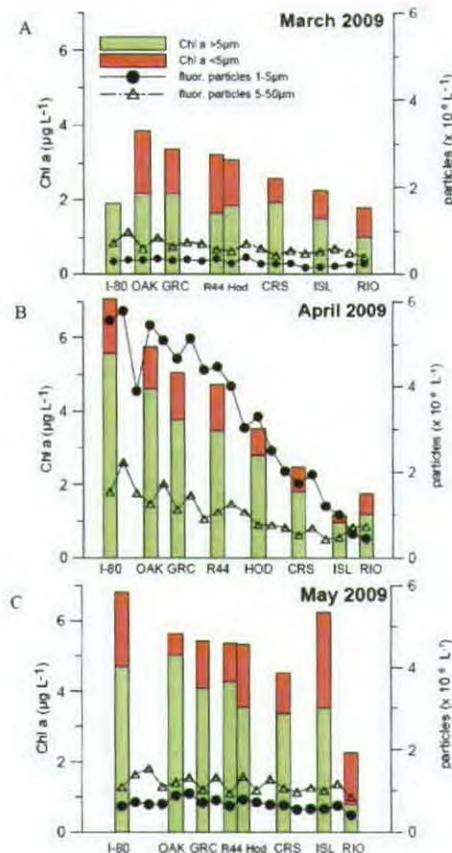


Figure 7. Longitudinal patterns in chlorophyll-a (green squares), biomass of major phytoplankton taxa (colored bars), concentration of small phytoplankton (black circles), and concentration of large phytoplankton (open triangles). Figure is from Engle 2010a.<sup>341</sup>

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.<sup>342</sup>

<sup>341</sup> Parker et al. 2010 and Engle 2010a.

<sup>342</sup> See District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.



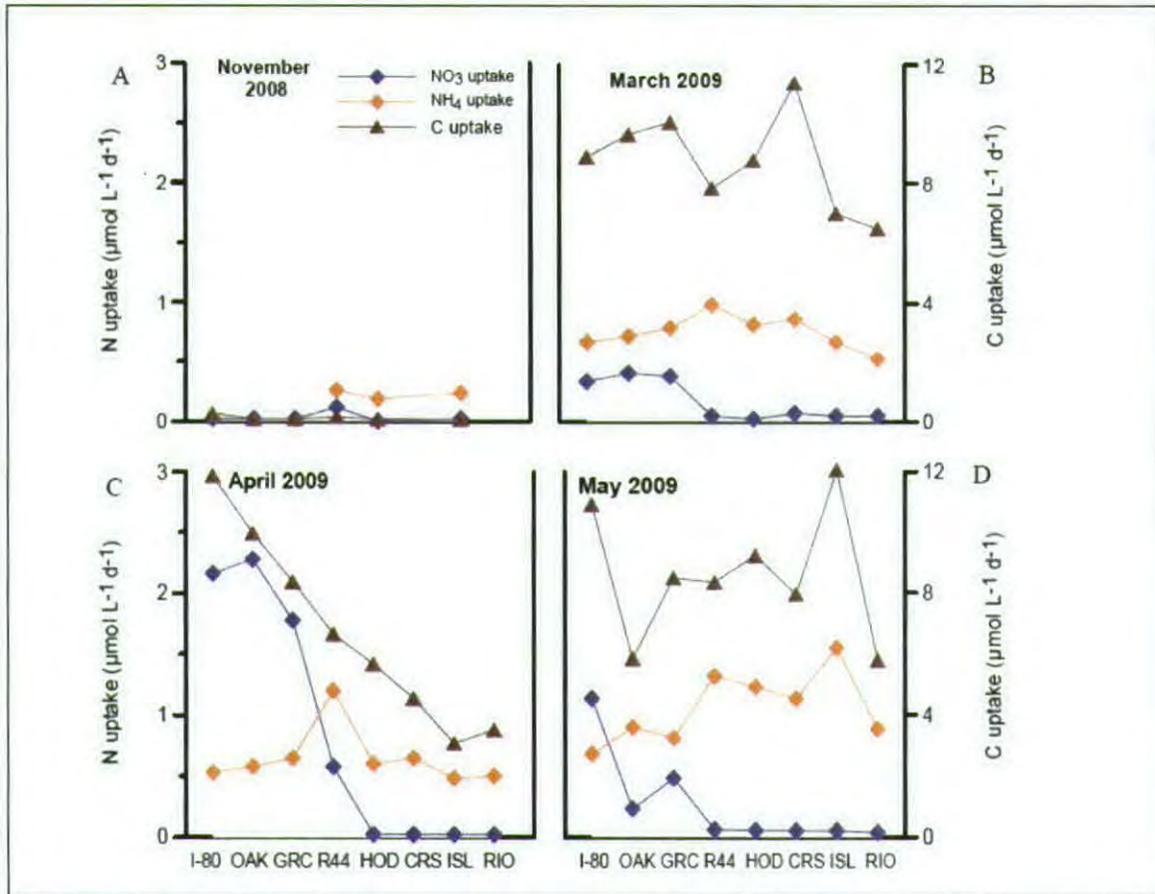
**Figure 8.** Longitudinal patterns in biomass of large phytoplankton (green bars and open triangles) and small phytoplankton (red bars and closed circles) in the Sacramento River between the I-80 Bridge and Rio Vista during Spring 2009. Large phytoplankton are presumed by the investigators to include 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.<sup>343</sup>

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.<sup>344</sup> Again, these field data directly contradict the

<sup>343</sup> Parker et al. 2010.

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

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



20  
 21 **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  
 22 between I-80 bridge and Rio Vista. Data do not reveal an inverse relationship between primary production and  
 23 ammonium uptake. Data further show that longitudinal patterns in primary production are not explained by the  
 24 SRWTP discharge (located between GRC and R44). Figure is from Parker et al. 2010.<sup>345</sup>

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

28 <sup>345</sup> Parker et al. 2010.

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

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

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

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

26 <sup>348</sup> Permit, p. J-6 ("Evidence for ammonia impairment of algal primary production in the Delta was reported for the  
 27 first time at the 6th Biennial Bay-Delta Science Conference by Dr. Parker. Dr. Parker stated that a U-shaped pattern  
 28 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]).

<sup>349</sup> See fn. 178, *supra*.

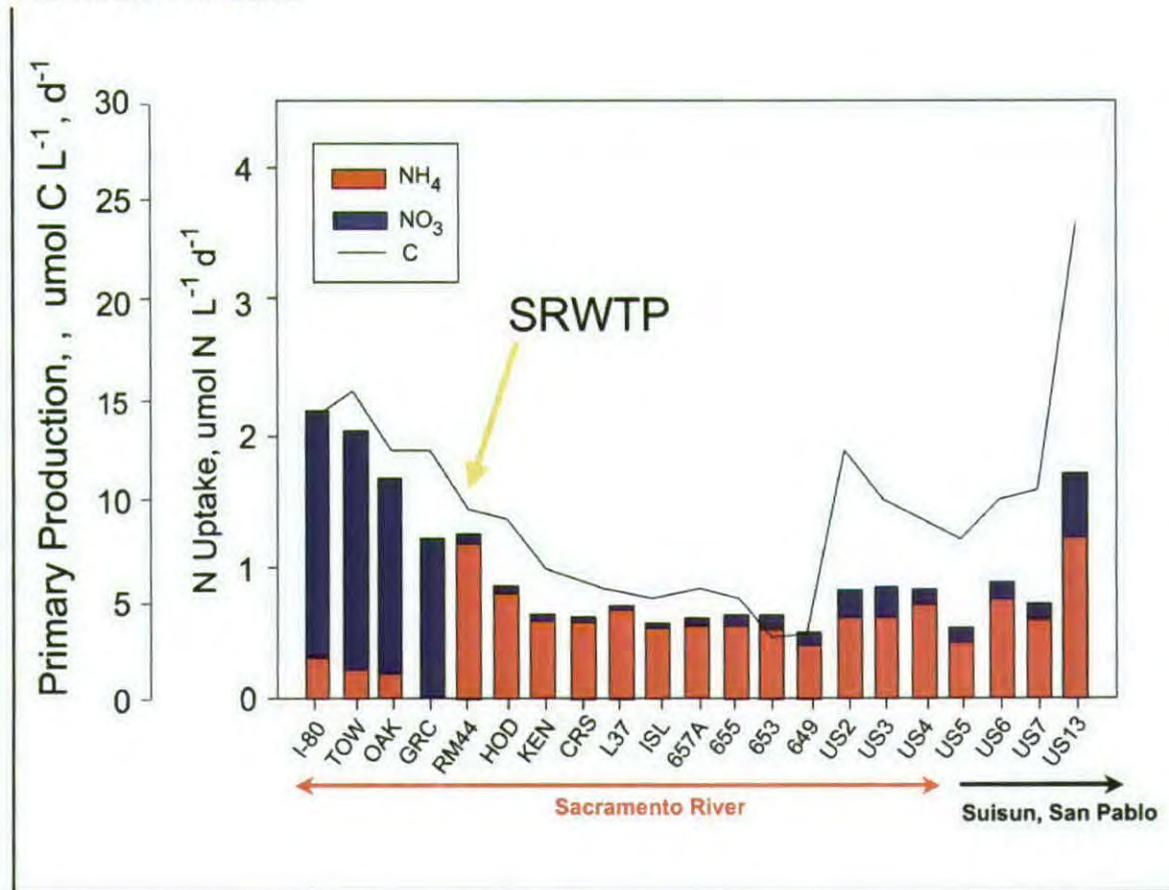
<sup>350</sup> Parker et al. 2009.

<sup>351</sup> Engle 2010a.

<sup>352</sup> Hearing Transcript, p. 293:11-13.

<sup>353</sup> District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

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



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

<sup>354</sup> 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.<sup>355</sup> *Microcystis* are considered to be less nutritious to primary consumers like zooplankton as compared to diatoms.<sup>356</sup> However, available research from the Delta—which is ignored in the Permit—argues against a simplistic association between *Microcystis* and nutrient form or concentration.<sup>357</sup> Delta studies conducted by Lehman et al. 2008 and 2010<sup>358</sup> and Mioni 2010<sup>359</sup> have found no apparent association between ammonium concentrations or  $\text{NH}_4^+:\text{P}$  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.<sup>360</sup> 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<sup>361</sup> and would be consistent with observations from other estuaries, where increased residence time (e.g., during drought) and

<sup>355</sup> Permit, p. J-1.

<sup>356</sup> Permit, p. J-8.

<sup>357</sup> District’s October 2010 Comments and Evidence Letter, pp. 29-30; Engle Written Testimony, p. 4.

<sup>358</sup> 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).

<sup>359</sup> 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).

<sup>360</sup> District’s October 2010 Comments and Evidence Letter, p. 29; Engle Written Testimony, p. 4.

<sup>361</sup> 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).

1 warmer temperatures are acknowledged as factors stimulating cyanobacterial (i.e., *Microcystis*)  
2 blooms.<sup>362</sup>

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

5 The Permit recites hypotheses that exist with respect to nutrient ratios and phytoplankton  
6 composition.<sup>363</sup> Significantly, it does not make findings that such hypotheses are valid, as  
7 discussed below. However, because the hypotheses are mentioned in the Ammonia Issues  
8 Appendix, the District addresses this issue below. The Permit apparently refers to two sources:  
9 (1) an opinion presumably held by R. Dugdale,<sup>364</sup> and (2) a statistical analysis by P. Glibert  
10 2010.<sup>365, 366</sup> Dugdale's opinion, which is not articulated in any of his publications, is not directly  
11 supported by any publicly available experimental work conducted to date by his research group at  
12 San Francisco State University (SFSU).<sup>367</sup> Taxonomic changes in Delta phytoplankton (i.e., cell  
13 counts or other direct evidence of species composition) have not been reported for experimental  
14 manipulations of the NH<sub>4</sub>:NO<sub>3</sub> ratio (i.e., grow-out experiments) by the Dugdale laboratory, nor  
15 has the work of Dugdale and his colleagues included experimental manipulations of N:P ratios.  
16 Similarly, although the Permit refers to a hypothesis advanced in Glibert 2010 (that nutrient ratios

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

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

23 Fernald, S.H., N.F. Caraco, and J.J. Cole. 2007. Changes in cyanobacterial dominance following the invasion of the  
24 zebra mussel *Dreissena polymorpha*: long-term results from the Hudson River Estuary. *Estuaries and Coasts*  
25 30:163-170 (Fernald et al. 2007).

26 <sup>363</sup> Permit, pp. J-7 to J-8.

27 <sup>364</sup> The opinion in the Permit is attributed to "Dugdale et al." in the text (Permit, p. J-8), but not clearly associated to  
28 a source in the footnote. (Permit, p. J-7.)

<sup>365</sup> 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).

<sup>366</sup> Permit, pp. J-7 to J-8.

<sup>367</sup> 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 NH<sub>4</sub>:NO<sub>3</sub> (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.

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

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

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

19  
 20  
 21 <sup>368</sup> Permit, pp. J-7 to J-8.

22 <sup>369</sup> District's October 2010 Comments and Evidence Letter, p. 32.

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

27 <sup>371</sup> Engle, D. and C. Suverkropp. 2010. Memorandum: Comments for Consideration by the State Water Resources  
 28 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).

<sup>372</sup> Engle & Suverkropp 2010, pp. 3-10.

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

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

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

27  
28 <sup>374</sup> See Engle & Suverkropp 2010 for more detail.

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

- 3 • Artificial Relationships and Inflated R<sup>2</sup> Values. The CUSUM transformation results in  
4 a very limited range of serially correlated data structures, which (if linear regression is  
5 performed for pairs of CUSUM series) leads to "correlations" with impressively  
6 inflated R<sup>2</sup> values that are largely artificial and cannot be interpreted in the same way as  
7 standard parametric correlation or regression analysis. Equally important, statistically  
8 significant relationships that *are* present in underlying data can be disguised when  
9 CUSUM time series are compared instead of real world measurements.
- 10 • Biased selection of variables, including failure to relate trends in nutrient ratios to  
11 those of phytoplankton or copepods. Several obvious pairings of environmental  
12 variables were omitted from Glibert's portfolio of CUSUM correlations, including  
13 those that were needed for her to claim that nutrient ratios and phytoplankton taxa  
14 were statistically related. For example, CUSUM regressions between nutrient *ratios*  
15 (TN:TP, NO<sub>3</sub>:NH<sub>4</sub>, or DIN:DIP) and phytoplankton indices (chl.a or abundances of  
16 individual taxonomic groups) were omitted from her analysis. Also, CUSUM trends  
17 in nutrient ratios were not directly compared to those for copepod abundance.  
18 NO<sub>3</sub>:NH<sub>4</sub> trends were not compared to *any* of the biological trends (phytoplankton,  
19 copepods, clams, or fish. They were compared only to trends in Delta outflow. As a  
20 consequence, even if one were to accept Glibert's flawed correlation approach, her  
21 publication still does not provide evidence that nutrient ratios and phytoplankton  
22 composition are statistically related.<sup>375</sup>

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

27 <sup>375</sup> Engle & Suverkropp 2010; Engle Written Testimony, p. 4; Suverkropp Written Testimony, pp. 1-2.

28 <sup>376</sup> District's October 2010 Comments and Evidence Letter, p. 33; Engle Written Testimony, p. 4.

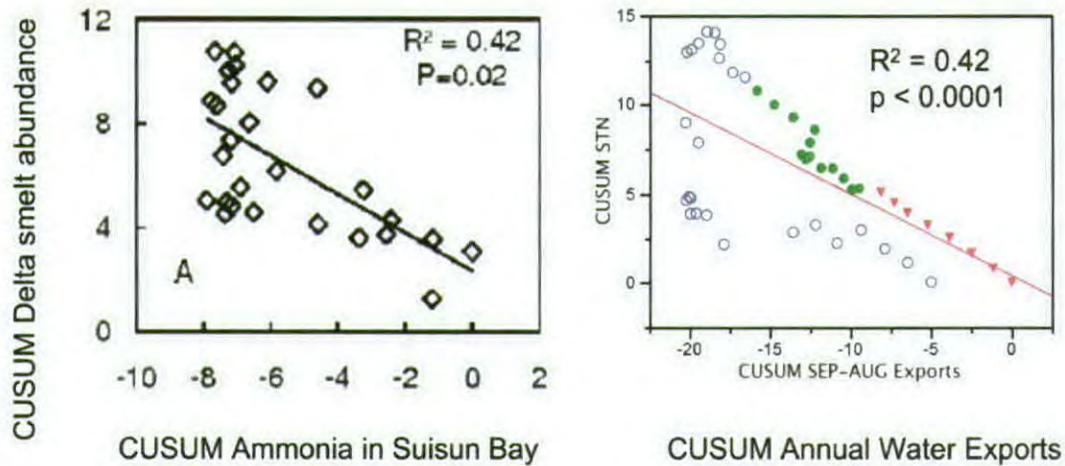
1 wide variety of non-nutrient environmental factors (essentially any factors which have trended  
 2 over time in the SFE in concert with changes in fish abundance such as clam abundance,  
 3 turbidity, or water exports) could be shown as highly correlated with pelagic fish abundance using  
 4 CUSUM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

11 ///  
 12 ///  
 13 ///  
 14 ///  
 15 ///  
 16 ///  
 17 ///  
 18 ///  
 19 ///  
 20 ///  
 21 ///  
 22 ///  
 23 ///  
 24 ///  
 25 ///

---

26 <sup>377</sup> District’s October 2010 Comments and Evidence Letter, p. 33; Engle Written Testimony, p. 4; Suverkropp  
 27 Written Testimony, pp. 1-2.

28 <sup>378</sup> 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 Towntnet 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.<sup>379</sup> The Permit also acknowledges that additional studies are necessary to determine if nutrient control would have hypothesized effects on phytoplankton community structure.<sup>380</sup> Yet, despite these caveats, the Permit fundamentally relies on inappropriate and unsupported hypotheses to theorize (and

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

<sup>380</sup> 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.”).

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

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

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

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

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).

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

6 Additionally, top-down effects on phytoplankton composition—caused by selective  
 7 grazing by clams and zooplankton—are not acknowledged in the Permit, but are likely to  
 8 influence the species composition of phytoplankton in the SFE, and may contribute to the  
 9 occurrence of *Microcystis*.<sup>387</sup> Clam grazing selectively removes larger particles from the water  
 10 column;<sup>388</sup> clams may consume a larger fraction of diatoms than smaller plankton taxa such as  
 11 flagellates. Kimmerer 2005<sup>389</sup> attributed a step decrease in annual silica uptake after 1986 to  
 12 efficient removal of diatoms by *C. amurensis* after its introduction in 1986. Grazing by  
 13 *Corbicula fluminea* can cause shallow habitats in the freshwater Delta to serve as a net sink for  
 14 phytoplankton.<sup>390</sup> Thus, it is possible that diatoms are differentially affected by benthic grazing  
 15 (as compared to motile or buoyant taxa) in both the brackish and freshwater Delta. Significantly,  
 16  
 17

---

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

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

23 <sup>386</sup> Foe et al. 2010, p. 13.

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

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

27 <sup>389</sup> Kimmerer 2005.

28 <sup>390</sup> 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>.

1 benthic grazing has been implicated as a factor favoring *Microcystis* over other phytoplankton.<sup>391</sup>

2 Grazing by zooplankton can also exert a top-down effect on phytoplankton composition.<sup>392</sup>

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

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

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

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

26 <sup>392</sup> See, e.g., Ger, K.A., P. Arneson, C.R. Goldman, and S.J. Teh. 2010. Species specific differences in the ingestion  
 27 of *Microcystis* cells by the calanoid copepods *Eurytemora affinis* and *Pseudodiaptomus forbesi*. Short  
 28 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.)

<sup>393</sup> Permit, pp. J-7 to J-8.

<sup>394</sup> Permit, p. J-8.

<sup>395</sup> District's October 2010 Comments and Evidence Letter, pp. 33-34; Engle Written Testimony, p. 4.

<sup>396</sup> District's October 2010 Comments and Evidence Letter, pp. 33-34; Engle Written Testimony, p. 4.

1 The Regional Board had ample evidence challenging the simplistic diatom → copepod →  
 2 fish “paradigm” that is used to justify much of the attention regarding ammonia and the SFE food  
 3 web.<sup>397</sup>

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

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

21 <sup>397</sup> See, e.g., Hearing Transcript, pp. 187:7-193:5; SRCSD Hearing Exhibits, PowerPoint slides 17-19, 22-23;  
 22 Districts’ October 2010 Comments and Evidence Letter, pp. 34-35.

23 <sup>398</sup> Heterotrophic organisms obtain energy by consuming pre-existing organic matter, as opposed to synthesizing  
 organic matter through photosynthesis.

24 <sup>399</sup> 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).

25 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).

26 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).

27 <sup>400</sup> See Ianora, A. and A. Miralto. 2010. Toxicogenic effects of diatoms on grazers, phytoplankton and other microbes: a  
 28 review. *Ecotoxicology*, 19, 493-511 (Ianora & Miralto 2010).

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

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

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

19 5. Chlorophyll-a levels below 10  $\mu\text{g/L}$  are frequently cited as evidence that  
 20 zooplankton in the Delta are food limited.<sup>403</sup> However, this threshold is based on growth  
 21 experiments conducted with a single cladoceran zooplankton species (*Daphnia magna*). It is  
 22 unclear whether the threshold is appropriately applied to any of the copepods in this system.

23  
 24 <sup>401</sup> See Figure 12; see also District's October 2010 Comments and Evidence Letter, p. 35; Engle Written Testimony, p. 4.

25 <sup>402</sup> See Engle, D. 2010c. Slides and Oral Remarks Presented in: *Engle, D. (2010) How well do we understand the*  
 26 *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).

27 <sup>403</sup> Müller-Solger, A.B., A.D. Jassby, and D.C. Müller-Navarra. 2002. Nutritional quality of food resources for  
 28 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.<sup>404</sup>

Copepod	Diatom	Egg Prod.	Hatching Success	Normal Nauplii	Complete Develop.
<b>Acartia tonsa</b>	<i>Thalassiosira weissflogii</i>	-	-	-	-
	<i>Thalassiosira pseudo nana</i>	-	-	-	-
	<i>Thalassiosira weissflogii</i>	+	+	-	-
	<i>Chaetoceros affinis</i>	-	-	-	-
	<i>Phaeodactylum tricornutum</i>	-	-	-	-
<b>Acartia hudsonica</b>	<i>Skeletonema costatum</i>	+	-	-	-
<b>Acartia clausi</b>	<i>Thalassiosira rotula</i>	+	-	-	-
<b>Centropages typicus</b>	<i>Thalassiosira rotula</i>	-	-	-	-
<b>Temora stylifera</b>	<i>Thalassiosira rotula</i>	-	-	-	-
	<i>Skeletonema costatum</i>	-	-	-	-
	<i>Phaeodactylum tricornutum</i>	-	-	-	-
	<i>Thalassiosira rotula</i>	+	-	-	-
	<i>Thalassiosira weissflogii</i>	+	-	-	-
	<i>Phaeodactylum tricornutum</i>	-	-	-	-
	<i>Skeletonema costatum</i>	-	-	-	-
	<i>Thalassiosira rotula</i>	+	-	-	-
<b>Temora longicornis</b>	<i>Thalassiosira rotula</i>	-	-	-	+
	<i>Thalassiosira weissflogii</i>	-	-	-	+
	<i>Leptocylindricus danicus</i>	-	-	-	+
	<i>Skeletonema costatum</i>	-	-	-	+
	<i>Chaetoceros affinis</i>	-	-	-	-
	<i>Chaetoceros decipiens</i>	-	-	-	-
	<i>Chaetoceros socialis</i>	-	-	-	-
	<i>Thalassiosira rotula</i>	-	-	-	-
	<i>Thalassiosira pseudo nana</i>	-	-	-	-
	<i>Thalassiosira rotula</i>	+	-	-	-
	<i>Thalassiosira weissflogii</i>	+	-	-	-
	<i>Chaetoceros affinis</i>	+	-	-	-
	<i>Leptocylindricus danicus</i>	-	-	-	-
	<i>Skeletonema costatum</i>	-	-	-	-

**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<sup>405</sup> and other published literature reviewed in Engle 2010c.<sup>406</sup> Figure is from Engle 2010c.

<sup>404</sup> 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.

<sup>405</sup> Ianora & Miralto 2010.

<sup>406</sup> Engle 2010c.



1 modeling or other approach) which would allow them to determine what reductions in ammonia  
2 would result in downstream concentrations.<sup>411</sup>

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

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

28 <sup>412</sup> 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.").

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

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

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

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

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

<sup>414</sup> Permit, p. J-10.

<sup>415</sup> 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; . . .").

<sup>416</sup> 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.").

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

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

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

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

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

26 \_\_\_\_\_  
27 <sup>417</sup> Sacramento Regional County Sanitation District, Low Dissolved Oxygen Prevention Assessment, prepared by  
Larry Walker Associates (May 2010) (LDOPA 2010).

28 <sup>418</sup> District's October 2010 Comments and Evidence Letter, p. 40; see also LDOPA 2010.

1 LDOPA 2010 did show that reduction in ultimate oxygen demanding (UOD) substances (i.e.,  
 2 BOD and/or ammonia) were needed in SRWTP effluent during the Dry season period of May 1  
 3 through October 31 to ensure that for future conditions, including potential critical drought  
 4 periods, dissolved oxygen concentrations in the Sacramento River downstream of the SRWTP  
 5 remain above the applicable Basin Plan objective of 7.0 mg/L.<sup>419</sup> Based on these findings, the  
 6 LDOPA 2010 recommended that the Regional Board adopt seasonal UOD limits of  
 7 275,000 lbs/day AMEL and 438,000 lbs/day MDEL for the Wet season and 169,000 lbs/day  
 8 AMEL and 234,000 lbs/day MDEL for the Dry season.<sup>420</sup> The District's recommendations for  
 9 UOD limits are proper WQBELs as they are designed to ensure compliance with the adopted  
 10 water quality objective for dissolved oxygen.<sup>421</sup> Specifically, by controlling the amount of UOD  
 11 in the effluent, receiving water dissolved oxygen objectives can be met.<sup>422</sup>

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

20 The data set in question shows dissolved oxygen concentrations at Hood to be below  
 21 7.0 mg/L at times.<sup>426</sup> However, due to concerns with the data, the District and others found it

22 <sup>419</sup> District's October 2010 Comments and Evidence Letter, p. 40; see also (LDOPA 2010).

23 <sup>420</sup> 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).

24 <sup>421</sup> See 40 C.F.R. § 122.44(d)(1)(iii).

25 <sup>422</sup> LDOPA 2010.

26 <sup>423</sup> Staff Response to Comments, p. 53.

27 <sup>424</sup> Staff Response to Comments, p. 53.

28 <sup>425</sup> Staff Response to Comments, p. 53.

<sup>426</sup> See Staff Response to Comments, p. 53.

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

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

13  
 14  
 15 <sup>427</sup> 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  
 16 Memo), pp. 12-21.

17 <sup>428</sup> Staff Response to Comments, p. 53; see also Permit, p. F-33.

18 <sup>429</sup> 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).

19 <sup>430</sup> Hearing Transcript, p. 234:4-10 ("When we looked at the Rio Vista data, our model could pretty well replicate  
 20 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.").

21 <sup>431</sup> See Email from Kathleen Harder to Robert Seyfried (March 25, 2010); see also DO Data Memo, pp. 3-12.

22 <sup>432</sup> Regional Board staff suggests that the District's data showed an upward bias. (Staff Report, p. J-10.) However,  
 23 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  
 24 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  
 25 Harder, Regional Board (Feb. 25, 2009) (provides information with respect to upward adjustments of dissolved  
 oxygen data at Hood)].)

26 <sup>433</sup> DO Data Memo.

27 <sup>434</sup> 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  
 28 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 . . .").

1 Due to this low bias, which was further confirmed by the District's 2010 data referenced  
 2 in J. Parker's email, the District determined it necessary to exclude the Hood data in the  
 3 calibration of its model. This decision was supported by the Regional Board's technical  
 4 consultant, Tetra Tech. "Unfortunately, the DO data obtained at Hood during most of 2008 may  
 5 be incorrect . . . In any case, the data at Hood do not appear usable for calibration at this time."<sup>435</sup>  
 6 On the other hand, the only information the Regional Board staff presents to suggest that the data  
 7 are valid is that they asked DWR staff to review the Hood data collected from June 2008 through  
 8 December 2009, and DWR staff reported that in many instances the dissolved concentrations at  
 9 Hood were below 7.0 mg/L.<sup>436</sup> The Regional Board presents no other evidence to support the  
 10 validity of the Hood data in question. Conversely, an email exchange between Regional Board  
 11 staff and DWR staff suggest that the DWR Hood data has had low bias issues in the past and has  
 12 been corrected upwards on numerous occasions.<sup>437</sup> Regional Board staff also provided testimony  
 13 that they too share concerns with the DWR Hood data: "Dissolved oxygen, the district referred to  
 14 a number of letters from Tetra Tech and others about problems with the Department of Water  
 15 Resources Hood data. We absolutely agree with those letters. We are concerned about that  
 16 data."<sup>438</sup>

17 The Regional Board has general authority and responsibility to disregard unreliable and  
 18 un-representative data. Contrary to its representation, such discretion is not limited to certified  
 19 information from a laboratory or other QA/QC information.<sup>439</sup> With respect to dissolved oxygen  
 20 data, there are no controlling or applicable regulations relative to the Regional Board's review  
 21 and acceptability of receiving water data. The SIP, on the other hand, provides as follows:

22 When implementing the provisions of this Policy, the RWQCB shall use all  
 23 available, valid, relevant, representative data and information, as determined by  
 24 the RWQCB. The RWQCB shall have discretion to consider if any data are  
 inappropriate or insufficient for use in implementing this Policy. Instances where

25 <sup>435</sup> LDOPA 2010, p. 6.

26 <sup>436</sup> Permit, p. J-10.

27 <sup>437</sup> DO Data Memo, Appendix B, Dempsey Email.

28 <sup>438</sup> Hearing Transcript, p. 426:21-25.

<sup>439</sup> See Staff Response to Comments, p. 53.

1 such consideration is warranted include, but are not limited to, the following:  
 2 evidence that a sample has been erroneously reported or is not representative of  
 3 effluent or ambient receiving water quality; questionable quality control/quality  
 assurance practices; and varying seasonal conditions.<sup>440</sup>

4 Although not directly controlling, the SIP's provisions here explain well the Regional  
 5 Board's discretion and responsibility with respect to data review. Further, unless specifically  
 6 stated in the Permit, the Regional Board relies on section 1.3 of the SIP to conduct its reasonable  
 7 potential analysis for both CTR and non-CTR constituents.<sup>441</sup> The SIP's reasonable potential  
 8 analysis under section 1.3 incorporates the data provisions cited directly above.<sup>442</sup> Thus, the SIP's  
 9 data provisions are instructive.

10 As indicated, and as is pragmatic, the Regional Board has the discretion to disregard or  
 11 consider only data insufficient if there is evidence that a sample (or samples) is not representative  
 12 of ambient receiving water quality.<sup>443</sup> In fact, the Regional Board has exercised this discretion on  
 13 numerous occasions.<sup>444</sup> Clearly, the evidence provided above, including conclusions by the  
 14 Regional Board's technical consultant, indicates that the DWR Hood data are not representative  
 15 of ambient receiving water conditions for dissolved oxygen.

16 Despite the substantial evidence in the record calling into question the validity of the  
 17 Hood data, or at the very least their use in calibrating the model, the Regional Board used this  
 18 alleged "discrepancy" to conclude at times the river fails to comply with the water quality  
 19 objective of 7.0 mg/L and, therefore, by extension, full nitrification of the effluent is required.

20  
21  
22  
23 

---

<sup>440</sup> SIP, p. 5.

24 <sup>441</sup> See Permit, p. F-45.

25 <sup>442</sup> SIP, p. 6.

26 <sup>443</sup> 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.

27 <sup>444</sup> See, e.g., Order No. R5-2009-0009 (Maxwell Public Utilities District), pp. F-29 to F-30; Order No. R5-2008-0184  
 28 (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.

1                   **b. Full Nitrification Is Unrelated to Compliance With Dissolved Oxygen**  
 2                   **Objective**

3                   Setting aside the data quality issue discussed above, the compliance or non-compliance  
 4 with dissolved oxygen objectives has nothing to do with granting or denying the ammonia mixing  
 5 zones in question, and the Regional Board made no determination of any appropriate limit of  
 6 oxygen demand to implement the numeric dissolved oxygen objective. The Regional Board  
 7 provides no explanation or basis as to its their finding that the Sacramento River's occasional  
 8 failure to comply with the dissolved oxygen objective of 7.0 mg/L at Hood results in the need for  
 9 the adopted ammonia limits and full nitrification.<sup>445</sup> The Permit references the need, and the  
 10 District agrees in part, that the District will need to reduce oxygen demanding constituents in  
 11 SRWTP effluent to ensure ongoing consistent compliance with the Basin Plan water quality  
 12 objective.<sup>446</sup> Accordingly, the District proposed seasonal UOD limits, as discussed above.  
 13 Although the Regional Board rejected the District's proposed limits, no actual reason was  
 14 provided to explain why the District's proposed UOD limits would not ensure compliance with  
 15 the dissolved oxygen objective.<sup>447</sup> At most, the Regional Board claims that the Wet season  
 16 ammonia limits should be the same as the Dry season limits.<sup>448</sup> Based on this logic, the Regional  
 17 Board should have adopted a UOD limits of 169,000 lbs/day as the AMEL, and 234,000 lbs/day  
 18 as the MDEL, both to be applied year-round. Instead, the Regional Board makes a huge and  
 19 unsubstantiated leap to say that the District is using all of the river's assimilative capacity and  
 20 therefore *full* nitrification is BPTC.

21                   The Regional Board's illogical approach fails to comply with federal regulations, the SIP,  
 22 and technical support documents for the adoption of water quality-based effluents limits. Federal  
 23 regulations provide that when a permitting authority finds that a discharge has reasonable

24 \_\_\_\_\_  
 25 <sup>445</sup> See Permit, pp. F-56 to F-57, J-9 to J-10.

26 <sup>446</sup> 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.").

27 <sup>447</sup> See Permit, p. J-10.

28 <sup>448</sup> See Permit, p. J-10.

1 potential to cause, or contribute to an in-stream excursion above the applicable numeric water  
 2 quality criteria, the permit must contain effluent limitations for that pollutant.<sup>449</sup> In this case, the  
 3 water quality criterion is the 7.0 mg/L water quality objective for dissolved oxygen.<sup>450</sup> Although  
 4 dissolved oxygen is not technically a pollutant, the discharge of oxygen demanding substances  
 5 can cause dissolved oxygen levels in the receiving water to fall below levels necessary to protect  
 6 aquatic life beneficial uses.<sup>451</sup> The oxygen demanding substances at issue here are ammonia and  
 7 BOD. Thus, assuming the Regional Board makes a finding of reasonable potential for dissolved  
 8 oxygen, it should follow appropriate procedures to calculate an effluent limitation (or limitations)  
 9 for oxygen demanding substances (i.e., UOD).<sup>452</sup> This has not occurred here.

10 First, there is no finding of reasonable potential directly related to dissolved oxygen.<sup>453</sup>  
 11 Second, the Permit fails to include any discussion or calculation of an appropriate effluent  
 12 limitation (or limitations) for oxygen demanding substances that is directly related to ensuring  
 13 compliance with the dissolved oxygen objective far downstream in the receiving water.<sup>454</sup> At  
 14 most, the Regional Board finds fault with the District's proposed Dry season UOD limit but does  
 15 not offer or identify an alternative limit for UOD.<sup>455</sup>

16 Considering the Regional Board's failure to make any connection between full  
 17 nitrification and compliance with dissolved oxygen objectives downstream of SRWTP's point of  
 18 discharge, the Regional Board improperly used dissolved oxygen as an excuse to deny mixing  
 19 zones for ammonia, or to find full nitrification is BPTC.

22 <sup>449</sup> 40 C.F.R. § 122.44(d)(1)(iii).

23 <sup>450</sup> Basin Plan, p. III-5.00.

24 <sup>451</sup> Permit, p. J-8.

25 <sup>452</sup> See 40 C.F.R. § 122.44(d).

26 <sup>453</sup> 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).

27 <sup>454</sup> 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).

28 <sup>455</sup> Permit, p. J-10.

1           **3. The Presence of Nitrosodimethylamines, a Nitrosoamine, Is an Improper**  
 2           **Basis to Deny Ammonia Mixing Zones or Find That Full Nitrification Is**  
 3           **Required**

4           In addition to the other findings discussed above, the Permit includes a finding with  
 5           respect to nitrosoamines to support the Regional Board's denial of mixing zones and by  
 6           extension, requirement for full nitrification. Specifically, the Permit finds that the Discharger's  
 7           effluent contains "nitrosoamines at levels that are greater than 100 times the primary MCL."<sup>456</sup>  
 8           This finding is unsupported for several reasons, some of which are similar to those discussed  
 9           previously.

10           First, there is no primary maximum contaminant level (MCL) for nitrosoamines in  
 11           general, or the specific nitrosoamines such as nitrosodimethylamines (NDMA). DPH has  
 12           published drinking water notification levels for NDMA and two other nitrosoamines.  
 13           Notification levels are intended "to provide information to public water systems and others about  
 14           certain non-regulated chemicals in drinking water that lack maximum contaminant levels."<sup>457</sup>  
 15           Thus, by definition, notification levels are not MCLs.

16           Further, DPH considers notification levels to be advisory in nature and NOT enforceable  
 17           standards.<sup>458</sup> Because, there exists no Primary MCLs for nitrosoamines, any finding suggesting  
 18           otherwise is improper. Next, although the State Board has indicated that it might be appropriate  
 19           to use notification levels in some instances, appropriate findings must be made when doing so.<sup>459</sup>  
 20           No such findings have been made in this Permit. To the extent the Regional Board intended to  
 21           reference notification levels versus MCLs in the Permit, it needed to include findings and  
 22           supportive evidence explaining why it was appropriate and relevant to apply notification levels as  
 23           water quality criteria. Again, the Permit includes no such findings.

24           \_\_\_\_\_  
 25           <sup>456</sup> Permit, p. F-57.

26           <sup>457</sup> Drinking Water Notification Levels and Response Levels: An Overview (Dec. 14, 2010), p. 2; see also *In the*  
 27           *Matter of the Petition of Water Replenishment District of Southern California, et al.*, State Board  
 28           Order WQ 2006-0001 (April 5, 2006) (*Petition for Water Replenishment District*), p. 2.

<sup>458</sup> Drinking Water Notification Levels and Response Levels: An Overview (Dec. 14, 2010), p. 4; see also *Petition of*  
*Water Replenishment District, supra*, p. 2.

<sup>459</sup> *Petition for Water Replenishment District*, p. 4.

1 With respect to NDMA, the California Toxics Rule (CTR) contains a criterion of  
 2 0.00069  $\mu\text{g/L}$  for the protection of human health.<sup>460</sup> The Permit conducts a reasonable potential  
 3 analysis for NDMA pursuant to the SIP's procedures and finds reasonable potential.<sup>461</sup> The  
 4 District disagrees with the Permit's findings regarding lack of assimilative capacity and denial of  
 5 a dilution credit.<sup>462</sup> However, the Permit otherwise follows the SIP procedures correctly and  
 6 calculates effluent limitations for NDMA accordingly, and the Regional Board properly adopted a  
 7 time schedule for NDMA in the TSO in accordance with relevant statutory provisions.<sup>463</sup>

8 However, the finding in question is, again, completely unrelated to whether or not it is  
 9 appropriate to grant or deny mixing zones related to the narrative toxicity objective and U.S. EPA  
 10 criteria for the protection of aquatic organisms. Further, the Regional Board's alleged connection  
 11 between nitrosoamines and full nitrification is unfounded. The connection is based on a non-  
 12 existent Primary MCL and represents an attempt to dictate the manner of compliance in violation  
 13 of Water Code section 13360. Water Code section 13360 states, "[n]o waste discharge  
 14 requirement or other order of a regional board, or the state board or decree of a court issued under  
 15 this division shall specify the design, location, type of construction, or particular manner in which  
 16 compliance may be had with that requirement, order, or decree, and the person so ordered shall be  
 17 permitted to comply with the order in any lawful manner." Based on this provision, the District  
 18 may comply with the effluents for NDMA in any lawful manner the District chooses, which may  
 19 or may not include full and/or partial nitrification. As indicated in the Infeasibility Analysis for  
 20 the SRWTP submitted to the Regional Board, the District intends to monitor influent data to  
 21 determine if there are influent sources.<sup>464</sup> If so, the District will perform a comprehensive NDMA  
 22 source identification study, which has not been conducted for the SRWTP service area because  
 23

24 \_\_\_\_\_  
<sup>460</sup> 40 C.F.R. § 131.38(b)(1), column D.

25 <sup>461</sup> Permit, pp. F-62 to F-63.

26 <sup>462</sup> See District's October 2010 Comments and Evidence Letter, pp. 47-49.

27 <sup>463</sup> Permit, pp. F-62 to F-63; Wat. Code, §§ 13300, 13385(j)(3).

28 <sup>464</sup> Sacramento Regional Wastewater Treatment Plant Infeasibility Analyses and Compliance Schedule Justifications (Aug 2010) (Infeasibility Analyses), p. 45.

1 NDMA was not previously identified as a pollutant of concern.<sup>465</sup> The District will also explore  
 2 treatment process optimization. Based on the results of these efforts, the District will be able to  
 3 determine the best method to ensure compliance with NDMA limits by December of 2015.

4 Accordingly, any denial of mixing zones for ammonia based on nitrosoamines is  
 5 inappropriate. Also, as with other issues discussed above, if the Regional Board desired to  
 6 regulate based on nitrosamines it was required to comply with applicable law for development of  
 7 WQBELs. And, any finding in the Permit that suggests the District must implement full  
 8 nitrification to comply with effluent limitations for NDMA is also inappropriate and must be  
 9 removed.

10 **4. Finding for Denial of Mixing Zones and Requirements for Full Nitrification**  
 11 **Based on Un-Published Draft U.S. EPA Criteria Are Not Appropriate**

12 The Permit references the existence of *Draft 2009 Update Aquatic Life Ambient Water*  
 13 *Quality Criteria for Ammonia – Freshwater* (Draft Ammonia Criteria) as one reason for denying  
 14 dilution credits and requiring full nitrification.<sup>466</sup> Any reliance on the Draft Ammonia Criteria is  
 15 misplaced because it is a draft and not available for use in a regulatory setting. In an email  
 16 exchange between Regional Board staff and U.S. EPA staff that is part of the Permit record,  
 17 U.S. EPA indicated that the Draft Ammonia Criteria would not be published until 2011. At this  
 18 time, the science has not been completed and the Draft Ammonia Criteria have not been peer  
 19 reviewed.<sup>467</sup> Both are critical steps to determining the appropriateness and validity of the Draft  
 20 Ammonia Criteria. Further, U.S. EPA cautioned that the Draft Ammonia Criteria must be  
 21 published by U.S. EPA and adopted by the states into their water quality standards “. . . before the  
 22 value is adopted, legally binding and useful in permits.”<sup>468</sup>

23 Regional Board staff stated that it has the discretion to use the Draft Ammonia Criteria to  
 24 interpret the Basin Plan’s narrative toxicity objective.<sup>469</sup> However, when using criteria to interpret

25 <sup>465</sup> Infeasibility Analyses, p. 45.

26 <sup>466</sup> Permit, pp. J-3 to J-4; see Staff Response to Comments, p. 25.

27 <sup>467</sup> Staff Response to Comments, p. 25.

28 <sup>468</sup> Email Exchange Between Kathleen Cole Harder, RWQCB, and Lisa Foersom Huff, U.S. EPA (Aug. 2, 2010).

<sup>469</sup> Staff Response to Comments, p. 25.

1 narrative water quality objectives, the Regional Board must make appropriate findings and  
 2 comply with the applicable processes under state and federal law discussed previously.<sup>470</sup> The  
 3 Permit does not include any findings to this effect and does not claim to do so.<sup>471</sup>

4 Even if the Draft Ammonia Criteria were applicable, there would still be insufficient  
 5 reason to deny a dilution credit to discharges from the SRWTP. The Regional Board approved  
 6 the District's model and mixing zones for chronic criteria.<sup>472</sup> The Draft Ammonia Criteria  
 7 includes a chronic criterion.<sup>473</sup> Further, in a year-long nutrient study conducted by the Regional  
 8 Board, "[a]mbient concentrations never exceeded the criteria."<sup>474</sup> Thus, assimilative capacity for  
 9 ammonia is available even if the more stringent Draft Ammonia Criteria are inappropriately used.

10 The District notes and agrees with the statements in the Permit that it is appropriate to use  
 11 U.S. EPA ammonia criteria to interpret the narrative toxicity objective. As indicated in  
 12 Attachment J of the Permit, "when the approved mixing zones are considered, [the SRWTP's  
 13 discharge] is in compliance with current USEPA acute and chronic ammonia criteria."<sup>475</sup>  
 14 Conversely, it is inappropriate to use the Draft Ammonia Criteria as a basis for denying dilution  
 15 credits or mixing zones for ammonia because the draft criteria are not approved by U.S. EPA.

16 Further, it is important to properly characterize the Draft Ammonia Criteria and their  
 17 relevance for evaluating impacts on POD species. Specifically, the Draft Ammonia Criteria are  
 18 more stringent than the adopted U.S. EPA ammonia criteria due to the consideration of ammonia  
 19 toxicity to sensitive freshwater mussels. In fact, the Draft Ammonia Criteria are proposed to be  
 20 bifurcated into separate categories, depending on the presence or absence of sensitive freshwater  
 21 mussel species in a water body. The "without mussels present" criteria, which are driven by the

22 \_\_\_\_\_  
 23 <sup>470</sup> 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).

24 <sup>471</sup> Staff Response to Comments, p. 25.

25 <sup>472</sup> 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.

26 <sup>473</sup> Permit, p. J-3.

27 <sup>474</sup> Permit, p. J-3.

28 <sup>475</sup> Permit, p. J-1.

1 protection of sensitive fish species, are no more stringent than the U.S. EPA ammonia criteria,  
 2 which are currently driven by the protection of sensitive fish species such as rainbow trout and  
 3 salmonids. In other words, with respect to the protection of Delta POD fish species, there is little  
 4 difference between the U.S. EPA ammonia criteria and the Draft Ammonia Criteria. Therefore,  
 5 evaluations of ammonia toxicity to Delta fish using the U.S. EPA ammonia criteria will continue  
 6 to provide meaningful and pertinent conclusions going forward, regardless of the status of the  
 7 finalization and adoption of the Draft Ammonia Criteria.

8 **5. Full Nitrification Is Not Justified Via State Board Resolution No. 68-16**

9 The Permit also includes a finding that, “[t]he Discharger must fully comply with  
 10 Resolution No. 68-16 that requires Best Practical Treatment and Control, which for this discharge  
 11 includes nitrification and denitrification of their wastewater.”<sup>476</sup> For the reasons described in  
 12 section VIII, *post*, the District disagrees that State Board Resolution No. 68-16 requires  
 13 implementation of those advanced treatment requirements, including full nitrification. As  
 14 discussed below, State Board Resolution No. 68-16 is designed to protect high-quality waters.  
 15 However, it is not a zero-degradation policy. It generally requires that when permitting  
 16 degradation, the Regional Board is required to ensure that additional degradation occurs pursuant  
 17 to limits that require BPTC and that the additional degradation is to the maximum benefit to the  
 18 people of the state. The determination of BPTC takes into consideration a number of factors  
 19 including the consideration of alternatives. In this case, the Permit fails to consider alternatives  
 20 with respect to partial nitrification that would result by adopting UOD limits as being BPTC. As  
 21 discussed in section VI.B.2, *supra*, partial nitrification would ensure protection of beneficial uses,  
 22 which is the primary goal of State Board Resolution No. 68-16.

23 Further, like with all of the other findings designed to support the Regional Board’s denial  
 24 of mixing zones for ammonia, the finding does not bridge the analytical gap between the evidence  
 25 and the Regional Board’s ultimate determination (i.e., no mixing zones), and the finding is not  
 26 supported by evidence in the record. Accordingly, the finding is improper and void.

27  
 28 <sup>476</sup> Permit, p. F-57.

1 **VII. THE PERMIT IMPROPERLY INCLUDES FINAL EFFLUENT LIMITATIONS**  
 2 **AND DENIES A MIXING ZONE FOR NITRATE BASED ON ALLEGED AND**  
 3 **UNEXPLAINED FAR FIELD IMPACT**

4 The Permit includes an AMEL for nitrate of 10 mg/L derived from application of the  
 5 Primary MCL of 10 mg/L (as nitrogen) at the end-of-pipe without the consideration of dilution.<sup>477</sup>  
 6 The Regional Board denied the granting of a human health mixing zone for nitrate, determining  
 7 that “a human health mixing zone for nitrate does not meet the mixing zone requirements of the  
 8 SIP.”<sup>478</sup> As with ammonia, the Permit refers to three SIP criteria that were determined not to be  
 9 met: the Regional Board determined the mixing zone would “compromise the integrity of the  
 10 entire water body, adversely impacts biologically sensitive or critical habitats, and produce  
 11 undesirable or nuisance aquatic life.”<sup>479</sup>

12 As in the case of ammonia, the denial of a nitrate mixing zone is flawed in multiple  
 13 respects. First, the denial has nothing to do with the merits of a human health mixing zone.  
 14 Second, the Permit findings fail to “bridge the analytic gap between the raw evidence and  
 15 ultimate decision or order.”<sup>480</sup> In this regard, the Permit is even more deficient for nitrate than it  
 16 is for ammonia. In particular, as a prelude to determining that the SIP criteria are not met, the  
 17 Permit states that “elevated nitrogen discharges from the Facility have been shown to be  
 18 negatively affecting the receiving water far downstream of the discharge within the Delta[.]”<sup>481</sup>  
 19 But there are *no findings whatsoever* to support this conclusion. In other words, for nitrate or  
 20 nitrogen, there is no equivalent to the ammonia “appendix” (Appendix J of the Permit). To the  
 21 extent Appendix J even discusses nitrogen, the appendix states that effects are “not known.”<sup>482</sup>  
 22 There simply is no linkage of any raw evidence to the determination to deny a mixing zone for  
 23 nitrate. Third, even if there were a finding linking evidence to the denial, there would be no basis

24 <sup>477</sup> Permit, p. 14 (Table 6); pp. F-44 to F-45, F-72.

25 <sup>478</sup> Permit, pp. F-44 to F-45.

26 <sup>479</sup> Permit, p. F-45. The September Tentative Permit circulated for public comment did not include a determination to  
 27 deny a mixing zone for nitrate under the SIP. (See November Redline Tentative Permit, p. F-45 to F-46.)

28 <sup>480</sup> *Topanga, supra*, 11 Cal.3d, pp. 506, 515.

<sup>481</sup> Permit, p. F-45.

<sup>482</sup> Permit, pp. J-7 to J-8.

1 to conclude that an effluent limit of 10 mg/L AMEL is necessary to prevent some impact far  
 2 downstream. In this regard, if impacts related to unspecified downstream uses existed, the MCL  
 3 for nitrate is not relevant. The Regional Board must implement the applicable narrative water  
 4 quality objective to derive a WQBEL. The Regional Board has not done so. Overlying all of the  
 5 above, the Regional Board did not consider the cost of denying the mixing zone or lack of harm  
 6 associated with a mixing zone.<sup>483</sup>

7 **A. An Effluent Limitation Equal to the MCL Is Unnecessary to Protect MUN Use**

8 The Basin Plan Chemical Constituents Objective incorporates MCLs by reference.<sup>484</sup> The  
 9 Permit correctly states that if the SRWTP is required to nitrify for ammonia reduction, nitrate  
 10 concentrations will increase, and as a result of the Permit requirements for ammonia, nitrate in  
 11 undiluted effluent would exceed the Primary MCL for nitrate of 10 mg N/L.<sup>485</sup>

12 The Permit explicitly acknowledges that there is assimilative capacity and dilution  
 13 available for compliance with the Primary MCL.<sup>486</sup> Regional Board staff also stated: “there is  
 14 sufficient dilution available in the Sacramento River that the river after mixing [with a nitrified  
 15 effluent] will not exceed the nitrate drinking water standard.”<sup>487</sup> The Permit correctly states that  
 16 there are no known drinking water intakes within the immediate vicinity of the discharge. The  
 17 closest downstream drinking water diversion is the Barker Slough Pumping Plant, 40 miles  
 18 distant, which diverts water from Barker Slough into the North Bay Aqueduct.<sup>488</sup> The North Bay  
 19 Aqueduct supplies water to remote drinking water intakes. Modeling completed by the District  
 20 indicates that the Sacramento River, and therefore the SRWTP discharge, has little influence on  
 21 the quality of water in Barker Slough.<sup>489</sup> The Permit properly notes that the effluent will be

22 \_\_\_\_\_  
 23 <sup>483</sup> See *In the Matter of the Petition of Yuba City*, State Board Order WQO 2004-0013 (July 22, 2004), p. 12 (regional  
 24 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.”).

25 <sup>484</sup> Basin Plan, p. III-3.00.

26 <sup>485</sup> Permit, pp. F-44, F-72.

27 <sup>486</sup> Permit, p. F-44.

28 <sup>487</sup> Staff Report, p. 20.

<sup>488</sup> Permit, pp. F-36, F-38, F-40.

<sup>489</sup> District’s October 2010 Comments and Evidence Letter, p. 55; see Permit, pp. F-30 to F-40.

1 sufficiently diluted at downstream drinking water diversion points to meet the Primary MCL.<sup>490</sup>

2 In fact, the Primary MCL will be met by a large margin.

3 In sum, it is beyond dispute that there is no need for an end-of-pipe limit equal to the  
4 MCL to protect the Municipal (MUN).

5 **B. Denial of a Mixing Zone for Nitrate Is Improper**

6 **1. The Denial Is Not Based on Findings or Compliance With Regulatory**  
7 **Requirements**

8 In consideration of the above conclusions with respect to the Primary MCL for nitrate, the  
9 obvious question is: why is the Permit's final effluent limitation equal to the MCL of 10 mg/L?  
10 The Permit does not say. And, there are no findings to support the limit.

11 As discussed above, the Permit contains a solitary statement asserting the mixing zone is  
12 denied because of negative effects of nitrogen "far downstream" within the Delta. What are the  
13 negative effects? Where? The Permit does not say. There is no finding linking, or attempting to  
14 link, any evidence to any adverse effect.

15 The Permit findings do refer to hypotheses concerning nitrogen and nitrogen:phosphorous  
16 ratios in the Delta.<sup>491</sup> However, the Regional Board made no finding whatsoever linking any  
17 evidence to a conclusion that there is a problem with nitrogen concentrations in the Delta, or  
18 N:P ratios.<sup>492</sup> The District has addressed these issues elsewhere, and indeed a lowering of  
19 N:P ratios could potentially have *adverse* effects.<sup>493</sup> But the critical point is that no adverse  
20 impact is even identified in the Permit. Similarly, there is a statement in the Permit that  
21 unidentified recent studies have indicated "a possibility" of nitrate toxicity to aquatic  
22 organisms.<sup>494</sup> However, there is no finding of any such impact at any nitrate concentration.

23 \_\_\_\_\_  
24 <sup>490</sup> Permit, p. F-44.

25 <sup>491</sup> Permit, p. J-7.

26 <sup>492</sup> Permit, pp. J-7 to J-8.

27 <sup>493</sup> See District's October 2010 Comments and Evidence Letter, pp. 52-55; Engle Written Testimony, p. 4; see also  
28 Hearing Transcript, pp. 201:15-202:23; SRCSD Hearing Exhibits, PowerPoint slides 22-23; see  
section VI.B.1.c.i.(d), *supra*.

<sup>494</sup> Permit, pp. F-71 to F-72.

1           Of course, were it the case that nitrogen resulted in undesirable changes in algae  
 2 composition or toxicity (hypotheses described on pages F-71 to F-72 and J-7 to J-8 of the Permit  
 3 but not endorsed in the Permit), the Basin Plan narrative water quality objective for toxicity or  
 4 biostimulatory substances would be implicated.<sup>495</sup> In that scenario, the Regional Board would be  
 5 obliged to determine reasonable potential and establish effluent limits in accordance with  
 6 applicable law including 40 C.F.R. section 122.44(d)(1)(vi) and the Basin Plan, as discussed in  
 7 sections VI.A.2, VI.B.1.b.iii, *supra*, of this Statement of Points and Authorities.<sup>496</sup>

8           **2. For the Same and Additional Reasons, Denial Based on the SIP Was**  
 9           **Improper**

10           In this case, the Regional Board improperly denied a human health mixing zone and  
 11 appropriate dilution credits for nitrate, determining that three of the eleven SIP criteria were not  
 12 met: (1) compromise the integrity of the entire water body; (2) adversely impact biologically  
 13 sensitive or critical habitats; and (3) produce undesirable or nuisance aquatic life.<sup>497</sup> As described  
 14 below, the Regional Board's denial of a nitrate human health mixing zone based on these criteria  
 15 is improper for several reasons, including that: the SIP is not applicable, there exists no evidence  
 16 that allowing a mixing zone for nitrate will harm aquatic life or other beneficial uses, and the  
 17 Permit fails to include any explanation, findings, or evidence as to how a human health mixing

18 \_\_\_\_\_  
 19 <sup>495</sup> 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).

20 <sup>496</sup> The Staff Report and Staff Response to Comments suggest that nitrate causes algal growth and that excessive algal  
 21 growth can impart undesirable tastes and odors. (See Staff Report, p. 22; Staff Response to Comments, p. 28.) There  
 22 was also hearing testimony on these subjects, but, as with the Tentative Permit upon which parties commented, not a  
 23 word in the Permit or its findings supports a determination to deny mixing zones on this basis. In addition, some of  
 24 this staff material outside the Permit references alleged effects not in the mixing zone or even "within the Delta," but  
 25 in areas to which water is exported from the Delta. The Staff Report and Staff Response to Comments are not  
 26 findings of the Regional Board and are not incorporated into the Permit. (See State Board Order No. WQ 95-4,  
 27 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  
 28 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.

<sup>497</sup> Permit, pp. F-44 to F-45.

1 zone for nitrate adversely affects beneficial uses in any way or would not comply with the three  
2 SIP criteria if appropriately applied.

3 **a. The SIP Mixing Zone Criteria Do Not Apply**

4 The SIP includes requirements for dilution credits and mixing zones for CTR-based (i.e.,  
5 priority pollutant) human health criteria. The SIP states: “. . . in establishing and determining  
6 compliance with effluent limitations for applicable human health, acute aquatic life, or chronic  
7 aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection  
8 in a RWQCB basin plan, the RWQCB may grant mixing zones and dilution credits to dischargers  
9 in accordance with the provisions of this section.”<sup>498</sup> Nitrate is not a priority pollutant regulated  
10 in the CTR, nor is application of the Primary MCL based on the narrative toxicity objective for  
11 aquatic life in the Basin Plan.<sup>499</sup> Thus, the development of effluent limits (including the  
12 consideration of dilution) is not subject to the SIP.<sup>500</sup>

13 The Basin Plan includes mixing zone provisions that are applicable to *non-priority*  
14 pollutant criteria/objectives. The Basin Plan states that the Regional Board may designate mixing  
15 zones provided that, “the discharger has demonstrated to the satisfaction of the Regional Water  
16 Board that the mixing zone will not adversely impact beneficial uses.”<sup>501</sup> Further, when  
17 determining the size of a mixing zone pursuant to the Basin Plan’s policy, the Regional Board is  
18 to consider the applicable procedures and guidelines in the TSD.<sup>502</sup> The Permit states that the  
19 Regional Board considered the Basin Plan policy and TSD procedures and guidelines.<sup>503</sup>  
20 However, the Regional Board’s determination for nitrate was based specifically on three criteria  
21 from the SIP, not the Basin Plan’s provisions.

22  
23  
24 <sup>498</sup> SIP, p. 15.

25 <sup>499</sup> See 40 C.F.R. § 131.38(b)(1); see also Permit, pp. F-71 to F-72.

26 <sup>500</sup> See SIP, p. 15.

27 <sup>501</sup> Basin Plan, p. IV-16.00.

28 <sup>502</sup> Basin Plan, p. IV-16.00.

<sup>503</sup> Permit, p. F-40.

1                   **b. Even Assuming the SIP Applies, the Regional Board Did Not Properly**  
 2                   **Determine That SIP Criteria Are Not Met**

3                   Contrary to the Permit's unsubstantiated determination, a human health mixing zone for  
 4 nitrate does not compromise the integrity of the entire water body. Based on the District's  
 5 *Sacramento River Harmonic Mean Mixing Zone Report* (June 2010),<sup>504</sup> the discharge is  
 6 completely mixed approximately three miles downstream. Accordingly, the Permit allocates  
 7 dilution credits of 56:1 for human carcinogen criteria, dilution credits of 29:1 for non-human  
 8 carcinogen criteria, and identifies a human health mixing zone of three miles.<sup>505</sup> In comparison,  
 9 the Sacramento River extends over 40 miles downstream from the discharge to the San Francisco  
 10 Bay, and the nearest downstream drinking water intake is the Barker Slough Pumping Plant, also  
 11 approximately 40 miles downstream.<sup>506</sup> The TSD provides guidance on determining effects on  
 12 the water body as a whole: "[i]f the total area affected by elevated concentrations within all  
 13 mixing zones combined is small compared to the total area of a waterbody (such as a river  
 14 segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a  
 15 whole, provided that they do not impinge on unique or critical habitats."<sup>507</sup> As with the acute and  
 16 chronic mixing zones for ammonia discussed above, the human health mixing zone here is small  
 17 in contrast to the river segment of 40 miles. Moreover, there would be no adverse effect on MUN  
 18 use from the Sacramento River or Delta. Thus, a human health mixing zone for nitrate will not  
 19 compromise the integrity of the entire water body. With respect to the remaining two criteria,  
 20 related to sensitive habitats and nuisance aquatic life, the Regional Board's determinations that  
 21 the criteria are not met is also unsupported. The Permit provides no reference or explanation or  
 22 findings linking evidence to its determinations as to how the human health mixing zone for nitrate  
 23 would adversely impact sensitive or critical habitats. Similarly, there are no findings in the  
 24 Permit linking any evidence to a determination that the human health mixing zone for nitrate

25 \_\_\_\_\_  
 26 <sup>504</sup> SRCSD, *Sacramento River Harmonic Mean Mixing Zone Report*, Larry Walker Associates (June 2010).

27 <sup>505</sup> Permit, pp. F-38 to F-39.

28 <sup>506</sup> Permit, pp. F-38, F-40.

<sup>507</sup> TSD, p. 34.

1 requested by the District will produce undesirable or nuisance aquatic life. If this situation  
 2 existed, the Regional Board would be obliged to determine reasonable potential and appropriate  
 3 effluent limits implementing the narrative toxicity or biostimulatory substances objective in  
 4 accordance with federal regulations<sup>508</sup> and the Basin Plan.

5 **C. The Argument for Denitrification to Satisfy State Board Resolution No. 68-16**  
 6 **Is Wholly Inadequate**

7 For the reasons described above and in section VIII, *post*, the District disagrees that  
 8 Resolution No. 68-16 requires implementation of denitrification requirements.

9 Nitrate discharge above 10 mg/L AMEL would not cause pollution or nuisance, and there  
 10 is no basis in the Permit or otherwise to conclude denitrification would provide maximum benefit  
 11 to the people of the state. Significantly, the Permit does not attempt to explain otherwise. The  
 12 maximum benefit determination requires a balancing of costs and benefits. The record clearly  
 13 shows that the Regional Board does not know whether a benefit from denitrification would occur.  
 14 The record also shows that denitrification would be extremely costly. Therefore, and assuming  
 15 state and federal antidegradation policies apply,<sup>509</sup> there is no showing of need for denitrification  
 16 as BPTC.

17 **D. Considerations Related to Remand**

18 In paragraph 6.D of this Petition (preceding this Statement of Points and Authorities) the  
 19 District requests, among other things, that the State Board vacate the improper effluent limitations  
 20 for nitrate, and remand with direction to adopt limitations if and as necessary, based on the MCL  
 21 for nitrate with appropriate allowance of a mixing zone. Whether effluent limitations will be  
 22 necessary depends upon the outcome of other permitting issues. If, for example, the Regional  
 23 Board determined that effluent limitations for oxygen demanding substances would likely lead to  
 24 nitrate levels at end-of-pipe excess of the MCL, a mixing zone would be allowed.

27 <sup>508</sup> 40 C.F.R. § 122.44(d)(1)(vi).

28 <sup>509</sup> See section VIII, *post*.

1 **VIII. THE REGIONAL BOARD MISAPPLIED AND MISINTERPRETED**  
 2 **ANTIDEGRADATION POLICIES CONTRARY TO**  
 3 **LAW AND STATE POLICY**

4 The Permit includes a brief section under the heading "Satisfaction of Antidegradation  
 5 Policy."<sup>510</sup> Here, in an unprecedented approach to the renewal of a permit for a municipal  
 6 discharger, the Regional Board undertook to support stringent new permit requirements in the  
 7 absence of *any* substantive information that the discharge will degrade baseline water quality.  
 8 The requirements are purportedly based on a new antidegradation "analysis," which, as discussed  
 9 below, is incomplete, conclusory, and unsupported in fact or law.

10 Under the applicable "antidegradation" policies, and in practice, regional boards  
 11 determine whether to allow new discharges or expansions of discharge. Neither circumstance is  
 12 present here. Instead, the policies have been converted to a shotgunning of superficial arguments  
 13 for a level of treatment or effluent quality for a previously permitted discharge.

14 The District fully recognizes that the Regional Board can impose increasingly stringent  
 15 requirements on a permitted discharge. That is what occurs with water quality-based permitting  
 16 and the adoption of WQBELs. In this Permit, however, logic, science, and law are lacking as a  
 17 basis for the WQBELs adopted, and the Regional Board sought to impose the same outcomes in a  
 18 different way. If this is to be the future of the policies, the State and Regional Boards can do  
 19 away with water quality planning and simply confirm that there is open-ended authority to dictate  
 20 outcomes in the regulatory permitting process.

21 In this section, the District demonstrates that the antidegradation policies were not  
 22 triggered by the renewal of the Permit. Furthermore, the District explains that even if the policies  
 23 were triggered, the analyses and conclusions in the Permit are erroneous.  
 24  
 25  
 26

27 \_\_\_\_\_  
 28 <sup>510</sup> 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).

1 **A. Renewal of the District's Permit Did Not Trigger State or Federal Antidegradation**  
 2 **Review**

3 The Regional Board determined that the renewal of the District's permit required an  
 4 antidegradation analysis.<sup>511</sup> This conclusion is contrary to State Board orders and policy, relevant  
 5 guidance, and the Regional Board's own application of antidegradation policies. Application of  
 6 the policy is triggered when a regional or state board action will lower existing high quality  
 7 water.<sup>512</sup> Before approving any reduction in water quality, or any activity that would result in a  
 8 reduction in water quality, "the Regional Board must first determine that the change in water  
 9 quality would not be in violation of State Board Resolution No. 68-16 or the federal  
 10 antidegradation policy."<sup>513</sup> This includes consideration of changes that have already occurred *if*  
 11 *they have not previously been reviewed for consistency with those policies.*<sup>514</sup>

12 Further, State Board guidance clarifies that the policy does not require "antidegradation"  
 13 analysis when existing water quality will not be reduced by the proposed action.<sup>515</sup> Existing water  
 14 quality includes water quality *already permitted or authorized*, even if the permitted degradation  
 15 has yet to occur.<sup>516</sup>

16 With respect to the federal antidegradation policy, "[t]he first step in any antidegradation  
 17 analysis is to determine whether or not the proposed action will lower water quality . . . . If the  
 18 action will not lower water quality, no further analysis is needed and EPA considers 40 CFR  
 19 131.12 to be satisfied."<sup>517</sup> State guidance confirms this approach: "The three-part test set forth in

20 \_\_\_\_\_  
 21 <sup>511</sup> Permit, p. F-93. State Policy is set forth in the "Statement of Policy With Respect to Maintaining High-Quality  
 22 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.

23 <sup>512</sup> *In the Matter of Petitions of the County of Santa Clara, et al.*, Order No. WQ 86-8 (Resolution No. 68-16 "sets  
 24 forth the circumstances under which *change* to existing high quality water will be allowed"), p. 28, emphasis added.

<sup>513</sup> *In the Matter of the Petition of Rimmon C. Fay*, Order No. WQ 86-17, p. 17.

25 <sup>514</sup> *In the Matter of Petitions for Reconsideration of Water Quality Certification for the Re-operation of Pyramid  
 Dam*, Order WQ 2009-0007, p. 12.

26 <sup>515</sup> Antidegradation Policy Implementation for NPDES Permitting, Administrative Procedures Update 90-004  
 (APU 90-004), p. 2.

27 <sup>516</sup> APU 90-004, p. 4.

28 <sup>517</sup> Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. § 131.12 (June 3, 1987), pp. 3-4.

1 the federal antidegradation policy is triggered by reduction in surface water quality. The first-step  
 2 in analyzing the requirements of the federal antidegradation policy as applied to a particular  
 3 activity is to determine if the activity will lower surface water quality; only if there is a reduction  
 4 in water quality must the three-part test be applied to determine if the activity may be  
 5 permitted.”<sup>518</sup>

6 The Regional Board acknowledged that antidegradation analyses were completed prior to  
 7 the granting of the 181 mgd discharge capacity.<sup>519</sup> The Permit does not allow for an increase in  
 8 flow or mass for any constituent of concern, except cyanide.<sup>520</sup> Because compliance with the  
 9 policies was previously considered, and the Permit does not allow for a reduction in water quality,  
 10 the requirement of an antidegradation analysis under the state and federal antidegradation policies  
 11 has not been triggered.

12 The Regional Board’s sole basis for asserting that a new analysis should be conducted is  
 13 that conditions in the Delta have changed.<sup>521</sup> Yet, nothing in the policy or associated guidance  
 14 requires a new analysis based on subjective evaluation of whether a “change” in some condition  
 15 has occurred since the time a discharge was originally authorized. The Regional Board has  
 16 attempted to open a door that does not exist. Moreover, it is not the Regional Board’s practice to  
 17 subject existing permitted discharges to complete antidegradation analyses; instead, such review  
 18  
 19

---

20 <sup>518</sup> Memorandum to Regional Board Executive Officers from William R. Attwater, Chief Counsel, Federal  
 21 Antidegradation Policy (Oct. 7, 1987) (Attwater Memo re: Federal Antidegradation Policy), p. 3. It is unlawful for  
 22 the Regional Board to apply or use a policy as a basis of regulation unless the policy has first been proposed,  
 23 adopted, and approved in accordance with the Administrative Procedures Act (APA). (Gov. Code, § 11340.5.) The  
 24 antidegradation policies have not been adopted to require analysis for an existing discharge, and application for that  
 25 purpose would require compliance with the APA.

26 <sup>519</sup> Permit, p. F-93.

27 <sup>520</sup> Permit, p. F-9-3. With respect to cyanide, the District performed and submitted a dynamic model, which  
 28 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.

<sup>521</sup> 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.

1 is triggered by the authorization of a new discharge or significant increase in flow rates.<sup>522</sup> Nor is  
 2 a different policy or practice applicable to Delta dischargers. The recently adopted permit for the  
 3 City of Rio Vista, which also authorizes discharges to the Sacramento River within the Delta,  
 4 finds that because the Order did not allow for an increase in flow or mass of pollutants, a  
 5 complete antidegradation analysis was not necessary.<sup>523</sup>

6 The Permit stands alone in its approach to antidegradation. In the absence of any basis to  
 7 deviate from existing policy and practice, the only reasonable inference to be drawn is that the  
 8 Regional Board began with the decision to dictate advanced treatment and invoked  
 9 antidegradation in support of the conclusion already reached.

#### 10 **B. The Regional Board Applied the Wrong Baseline**

11 On May 20, 2009, the District submitted an Expansion ADA to support the District's  
 12 application for a discharge of 218 mgd.<sup>524</sup> By letter dated June 11, 2010, the District withdrew its  
 13 request for expansion.<sup>525</sup> Once the District's request for expansion was withdrawn, the Expansion  
 14 ADA and its analysis were no longer required. However, the Regional Board relied upon the  
 15 Expansion ADA to develop an argument that the existing discharge is degrading the receiving  
 16 water.<sup>526</sup> As detailed below, this analysis is flawed for several reasons.

17 State Board guidance provides that, "[b]aseline quality is defined as the best quality of the  
 18 receiving water that has existed since 1968 when considering Resolution No. 68-16, or since 1975

19 \_\_\_\_\_  
 20 <sup>522</sup> 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.

21 <sup>523</sup> Order No. R5-2010-0081 (City of Rio Vista) p. F-56. Neither the findings nor the Fact Sheet suggest that the  
 22 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.

23 <sup>524</sup> Larry Walker Associates, Antidegradation Review for Proposed Wastewater Treatment Plant Discharge  
 24 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.

25 <sup>525</sup> 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);  
 26 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  
 27 capacity are stated in the referenced letter to the Executive Director of the Regional Board from the District Engineer.

28 <sup>526</sup> 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.")

1 under the federal policy, *unless subsequent lowering was due to regulatory action consistent with*  
 2 *state and federal antidegradation policies*. If poorer water quality was permitted, the most recent  
 3 water quality resulting from permitted action is the baseline water quality to be considered in any  
 4 antidegradation analysis.”<sup>527</sup> Undeterred by this unambiguous direction, which it has previously  
 5 followed, and fully aware that the Permit does not allow for an increase in pollutant loading, the  
 6 Regional Board staff invented a new trigger for antidegradation by calculating the amount of  
 7 reduced assimilative capacity resulting from the permitted discharge to determine if this  
 8 “increased” pollutant loading was significant.<sup>528</sup> In other words, the Regional Board established a  
 9 unique baseline for the Sacramento region, one that has not been applied elsewhere in the state  
 10 and is contrary to state policy.

11 Despite the fact that no increase in capacity was being requested or considered, Regional  
 12 Board staff used information provided in the Expansion ADA to evaluate impacts at the currently  
 13 permitted discharge flow of 181 mgd.<sup>529</sup> The Regional Board evaluated the District’s current  
 14 loading to determine whether the discharge “degrades” receiving water quality.<sup>530</sup> The baseline  
 15 for the District and the District alone, which has served millions of people and discharged to the  
 16 river for decades, was set at a discharge rate of zero—as though the facility and Sacramento  
 17 region did not exist prior to issuance of this Permit. The Permit improperly characterizes baseline  
 18 water quality by comparing the District’s already-permitted effluent quality to background river  
 19 concentrations (i.e., mean Sacramento River concentration at monitoring location RSWU-001  
 20 upstream of the SRWTP discharge) to calculate the percent of assimilative capacity used. Such  
 21 an approach is unprecedented and inconsistent with state policies and guidelines. In fact, the  
 22 Permit’s approach treats the Sacramento region differently from every other region and

25 <sup>527</sup> APU 90-004, p. 4. For examples of other Permits applying the permitted discharge as the baseline, see Order  
 26 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.

27 <sup>528</sup> Permit, p. F-94.

28 <sup>529</sup> Permit, p. F-94.

<sup>530</sup> Permit, pp. F-93 to F-94.

1 discharger in the state, where the test has consistently been whether the Permit authorizes any  
2 additional degradation above existing conditions.<sup>531</sup>

3 **C. There Is No Evidence the District's Discharge Is Significantly Degrading Receiving**  
4 **Water**

5 Assuming the antidegradation policies apply, the Regional Board erred in applying the  
6 Expansion ADA to find that the existing permitted discharge is degrading the receiving water and  
7 therefore certain specified levels of treatment are required, and in failing to set forth findings that  
8 connect evidence to the conclusions.<sup>532</sup> In concluding that the District's discharge is causing  
9 significant degradation, the Regional Board failed to "bridge the analytic gap" between  
10 supporting facts and its ultimate decision.<sup>533</sup> Regulatory agencies are required to set forth  
11 findings that link their ultimate conclusions to the evidence. This legal requirement reduces "the  
12 likelihood that [an] agency will randomly leap from evidence to conclusions" and is critical to  
13 ensure participating parties that the decision rendered is reasoned and equitable.<sup>534</sup> As the  
14 California Supreme Court has noted, clear articulation of "the relationships between evidence and  
15 findings and between findings and ultimate action" discloses the analytic route the administrative  
16 agency "traveled from evidence to action."<sup>535</sup> The Legislature "contemplated that the agency  
17 would reveal this route."<sup>536</sup>

18 U.S. EPA has provided guidance for conducting antidegradation reviews for high quality  
19 waters (Tier 2) pursuant to federal policy.<sup>537</sup> The King Memorandum discusses significance

20 <sup>531</sup> See APU 90-004, p. 4.

21 <sup>532</sup> Information in the Expansion ADA actually supports a finding that the current permitted discharge does not  
22 significantly impact water quality in the Sacramento River. The Expansion ADA showed no significant impact to  
23 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.)

24 <sup>533</sup> See *Topanga, supra*, 11 Cal.3d, pp. 506, 515.

<sup>534</sup> *Topanga, supra*, 11 Cal.3d, p. 516.

25 <sup>535</sup> *Environmental Protection Information Center v. California Department of Forestry and Fire Protection* (2008)  
44 Cal.4th 459, 516.

26 <sup>536</sup> *Environmental Protection Information Center v. California Dept. of Forestry and Fire Protection, supra*,  
27 44 Cal. 4th, p. 516.

28 <sup>537</sup> 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).

1 thresholds for use by states and tribes, measured by use of available receiving water assimilative  
 2 capacity, that trigger a complete antidegradation analysis including consideration of social and  
 3 economic impacts. The intent of Tier 2 protection “is to maintain and protect high quality waters  
 4 and not to allow for any degradation beyond a *de minimis* level without having made a  
 5 demonstration, with opportunity for public input, that such lowering is necessary and  
 6 important.”<sup>538</sup> A significance threshold of a ten percent reduction in available assimilative  
 7 capacity is “workable and protective in identifying those significant lowerings of water quality  
 8 that should receive a full Tier 2 antidegradation review, including public participation.”<sup>539</sup> In the  
 9 Staff Response to Comments, staff dismisses the King Memorandum as non-binding.<sup>540</sup> The  
 10 point, of course, is not that the memorandum is controlling but that it is relevant and has been  
 11 consistently followed by the Regional Board since issued. In any event, the Permit fails to  
 12 explain or document why the ten percent threshold that has been consistently applied in Central  
 13 Valley Region permits was not applied to the District’s permit.<sup>541</sup>

14 The Permit purports to portray the estimated percent of assimilative capacity of the  
 15 receiving water used by the District with respect to its current discharge.<sup>542</sup> Approximately  
 16 \$1 billion in new capital costs (and tens of millions in annual operation and maintenance) are  
 17 associated with treatment to achieve proposed new effluent filtration requirements including total  
 18 coliform, yet Table F-18 of the Permit does not address coliform or assimilative capacity for

19 <sup>538</sup> King Memorandum, p. 1.

20 <sup>539</sup> See *Ohio Valley Environmental Coalition v. Horinko* (S.D. W.Va. 2003) 279 F.Supp.2d 732, 779 (upholding  
 21 U.S. EPA’s approval of West Virginia antidegradation implementation procedures that include a *de minimis*  
 22 provision of up to ten percent of the available assimilative capacity for any given pollutant); see also *Kentucky*  
 23 *Waterways Alliance v. Johnson* (6th Cir. 2008) 540 F.3d 466, 486 (court found that “[b]ased on these authorities”  
 24 [referring, in part, to the King Memorandum] . . . I would find that, in order to be considered *de minimis*, . . . a  
 25 categorical exemption from Tier II review must not permit any individual discharge that would destroy more than ten  
 26 percent of a Tier II water’s available assimilative capacity.”). In the Permit, the Regional Board appears to have  
 27 followed this guidance to a point. Table F-18 of the Permit indicates that the ten percent threshold is exceeded for  
 28 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.

<sup>540</sup> Staff Response to Comments, pp. 35-36.

<sup>541</sup> 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.)

<sup>542</sup> Permit, pp. F-98 to F-99, Table F-18.

1 coliform. The information in Table F-18 does not support a finding that the discharge degrades  
 2 water quality with respect to total coliform or other constituents relevant to filtration  
 3 requirements.<sup>543</sup> Similarly, the Permit imposes major new capital and operation and maintenance  
 4 costs for nitrate removal, but Table F-18 shows that the current discharge utilizes zero percent of  
 5 assimilative capacity for nitrate.<sup>544</sup> Notably, any “degradation” attributable to nitrate would occur  
 6 only after the District fully nitrifies *in response to* the Permit. The information in Table F-18  
 7 does not plausibly provide support for the Regional Board’s overly broad generalization  
 8 regarding “degradation,” let alone provide the analysis required to satisfy *Topanga*.

9 Nor does the Permit fare better in the case of other parameters. With the exception of  
 10 ammonia, bromodichloromethane, and chlorpyrifos, the Regional Board’s analysis shows that the  
 11 District’s current discharge at its current level of treatment utilizes no more than ten percent of  
 12 assimilative capacity for all other constituents listed.<sup>545</sup> Even the current loadings of  
 13 bromodichloromethane, and ammonia in the summer months, barely exceed ten percent.<sup>546</sup> For  
 14 many constituents, the actual use of assimilative capacity is significantly lower than ten percent  
 15 and typically is below one percent. As pointed out in the District’s Expansion ADA, incremental  
 16 changes of this small magnitude are not measurable for many of these parameters.

17 Thus, it is clear the ten percent threshold sanctioned by U.S. EPA guidance and  
 18 consistently applied by the Regional Board would not warrant an antidegradation analysis for the  
 19 vast majority of constituents. Undaunted, the Regional Board simply abandoned the threshold  
 20 and instead selected—arbitrarily—ten constituents it deems to have the greatest impact on  
 21 receiving water quality. The Permit identifies ammonia, salinity (in the forms of EC, TDS, and  
 22 chloride), copper, cyanide, bis(2-ethylhexyl)phthalate, bromodichloromethane, chloroform, and  
 23 chlorpyrifos as having the largest impacts on the receiving water.<sup>547</sup> The range of assimilative

24 \_\_\_\_\_  
 25 <sup>543</sup> 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.

26 <sup>544</sup> Permit, p. F-98, Table F-18.

27 <sup>545</sup> Permit, pp. F-98 to F-99, Table F-18; District’s October 2010 Comments and Evidence Letter, pp. 61-62.

28 <sup>546</sup> Permit, p. F-98, Table F-18.

<sup>547</sup> Permit, p. F-94.

1 capacity for each of the constituents identified varies from 0.6% for chloroform to 44.4% for  
 2 chlorpyrifos.<sup>548</sup> Thus, the Permit employs an *ad hoc* threshold of *one half of one percent (0.5%)*  
 3 use of available assimilative capacity in the Sacramento River downstream of the District's  
 4 discharge as a benchmark to determine that a particular pollutant in the discharge is degrading  
 5 downstream receiving water quality. A significance threshold of 0.5% is exceptionally low, and  
 6 is, in fact, not likely measurable in ambient waters.

7 The use of a 0.5% significance threshold for an existing discharge is not consistent with  
 8 U.S. EPA guidance or with previous determinations made by the Regional Board. In adopting a  
 9 permit for Yuba City, the Regional Board relied on APU 90-004 to conclude that a complete  
 10 antidegradation analysis was not required for the discharges (even though a complete  
 11 antidegradation analysis was performed by the discharger).<sup>549</sup> The Regional Board also  
 12 determined that such a finding was consistent with U.S. EPA guidance.<sup>550</sup>

13 In other permitting actions, the Regional Board incorporated and accepted the ten percent  
 14 threshold as a measure of significance for determining "substantial lowerings of water quality that  
 15 should receive a full Tier 2 antidegradation review."<sup>551</sup> In the 2007 permit for the El Dorado Hills  
 16 wastewater treatment plant, constituents that were considered to significantly increase  
 17 concentration or mass downstream (i.e., >10% use of assimilative capacity) were subject to an  
 18 alternatives analysis to determine if the proposed action would be in the best socioeconomic  
 19 interest of the people of the region, and to the maximum benefit to the people of the state.<sup>552</sup>

20 The Regional Board has not articulated a technical basis, or legal authority, for  
 21 establishing a new significance threshold applicable solely to the District's discharge, let alone  
 22 the District's already-permitted discharge.

23  
 24  
 25 <sup>548</sup> Permit, pp. F-98 to F-99.

26 <sup>549</sup> Order No. R5-2007-0134-01, *supra*, p. F-72.

27 <sup>550</sup> Order No. R5-2007-0134-01, *supra*, p. F-72.

28 <sup>551</sup> Order No. R5-2007-0069, *supra*, p. F-57.

<sup>552</sup> Order No. R5-2007-0069, *supra*, pp. F-57 to F-58.

1 Finally in this regard, Table F-18 undercuts other portions of the Permit. If, for example,  
 2 ammonia discharges utilize 2.3-10.3% of the assimilative capacity as shown in the Table, that  
 3 necessarily means that there is assimilative capacity remaining after the discharge. Thus, there is  
 4 no basis to conclude that any applicable narrative or numeric water quality standard for ammonia  
 5 is exceeded in the receiving water as a result of SRCSD's discharge.

6 **D. The Determination of Best Practicable Treatment or Control (BPTC) Is**  
 7 **Unsupported by Facts and Contrary to Law and Policy**

8 **1. BPTC Is Not Treatment for Treatment's Sake**

9 Assuming the antidegradation policies apply, there are additional reasons they were  
 10 misapplied here. As noted above, State Board Resolution No. 68-16 applies to waters of the state  
 11 where the existing quality of water is better than necessary to support existing beneficial uses, and  
 12 sets forth the circumstances under which change to existing high quality waters will be allowed.<sup>553</sup>  
 13 The determination as to whether a water body is "high-quality" is pollutant specific.<sup>554</sup> If a water  
 14 is high-quality for a specified pollutant, any activity which "produces or may produce waste, or  
 15 increased volume or concentration of waste", will be required to comply with waste discharge  
 16 requirements that result in BPTC of the discharge.<sup>555</sup> BPTC is the level of treatment necessary to  
 17 assure that pollution or nuisance will not occur, and that the highest water quality consistent with  
 18 maximum benefit to people of the state will be maintained.<sup>556</sup>

19 State Board Resolution No. 68-16 incorporates the federal antidegradation policy.<sup>557</sup> The  
 20 antidegradation policies do not prohibit changes in water quality.<sup>558</sup> Instead, to the extent that the  
 21 Regional Board relied on determinations of available assimilative capacity to contend that an

22 <sup>553</sup> State Board Order No. WQ 86-8, *supra*, p. 28.

23 <sup>554</sup> APU 90-004, p. 4.

24 <sup>555</sup> State Board Resolution No. 68-16.

25 <sup>556</sup> State Board Resolution No. 68-16. It is worth noting that BPTC is not a basis for establishing WQBELs, which  
 26 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.

27 <sup>556</sup> State Board Resolution No. 68-16.

28 <sup>557</sup> See State Board Order No. WQ 86-17, *supra*, pp. 17-18.

<sup>558</sup> Attwater Memo re: Federal Antidegradation Policy, p. 10.

1 antidegradation analysis was warranted, the federal approach to Tier 2 protection would apply.<sup>559</sup>  
 2 Tier 2 employs a public interest balancing test that weighs impacts on water quality against the  
 3 need for economic or social development. The greater the impact on water quality, the more  
 4 robust and compelling the justification must be regarding the need to accommodate economic or  
 5 social development.<sup>560</sup> As discussed below and elsewhere in this memorandum, the impact to  
 6 water quality of maintaining the existing permitted discharge is negligible. However, the  
 7 socioeconomic impact of requiring over \$2 billion in new treatment is significant. Thus, the  
 8 treatment required to comply with the Permit is not “to the maximum benefit” to the region or the  
 9 State as a whole.

10 The determination of BPTC must follow an in-depth analysis. What constitutes BPTC for  
 11 a particular discharge depends on the circumstances of that discharge and several additional  
 12 factors. A determination of BPTC is guided by the reasonableness standard.<sup>561</sup> “One factor to be  
 13 considered in determining best practicable treatment or control would be the water quality  
 14 achieved by other similarly situated dischargers and the methods used to achieve that water  
 15 quality. Information concerning alternatives and costs of alternatives is relevant to determining  
 16 compliance with Resolution 68-16.”<sup>562</sup> “While the Regional Water Board may not specify the  
 17 manner of compliance with waste discharge requirements, however, it must consider ‘best  
 18 practicable treatment or control’ of the discharge. The Regional Water Board should require the  
 19 [discharger] to consider additional methods that will control the discharge, including methods  
 20  
 21

22 <sup>559</sup> The federal policy sets forth three tiers for protection: Tier 1, which requires protection of existing instream water  
 23 uses and is intended to serve as a baseline to ensure that existing uses be maintained; Tier 2, which requires that  
 24 where water quality exceeds levels necessary to support beneficial uses (i.e., is better than necessary), water quality  
 25 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.

26 <sup>560</sup> Attwater Memo re: Federal Antidegradation Policy, p. 12.

27 <sup>561</sup> State Board Order No. WQ 86-8, *supra*, p. 29.

28 <sup>562</sup> *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.

1 used by other similarly situated dischargers, in determining the appropriate effluent  
2 limitations.”<sup>563</sup>

3 The law does not require “treatment for treatment’s sake.”<sup>564</sup> Practicability is more than a  
4 matter of engineering feasibility or whether something *can* be done. The question is whether, on  
5 balance, the water quality benefit to be achieved warrants the costs of the application of the  
6 technology, including increased energy demands and other impacts.

7 Here, the Regional Board concluded that BPTC for the District’s discharge includes  
8 implementation of nitrification, denitrification, and the equivalent of Title 22 tertiary filtration  
9 with ultraviolet light or chlorine disinfection treatment.<sup>565</sup> The Permit includes statements  
10 regarding conditions in the Delta and restates the conclusion that the Permit requires BPTC.  
11 Nowhere in the Permit does the Regional Board cite the evidence supporting this conclusory  
12 finding nor set forth a meaningful analysis as to why, based on the evidence, these particular  
13 requirements and not others constitute BPTC. There is no meaningful effort to determine whether  
14 these requirements are reasonable, or, whether they are necessary to assure that pollution or  
15 nuisance will not occur. Further, there is no evidence to establish the existence of a benefit of  
16 consequence.<sup>566</sup>

17 Before delineating BPTC, the Regional Board must first conduct a complete  
18 antidegradation analysis considering both Resolution No. 68-16 and the federal antidegradation  
19 policy. APU 90-004 provides guidance regarding when an antidegradation analysis is required,

20 \_\_\_\_\_  
21 <sup>563</sup> State Board Order No. WQ 2000-07, *supra*, p. 12. While BPTC is not expressly defined, guidance can be found  
22 in the CWA provisions related to development of effluent limitations requiring application of “the best practicable  
23 control technology currently available as defined by the Administrator.” (33 U.S.C. § 1311(b)(1)(A).) “Best  
24 practicable control technology currently available” is determined based on several factors, including, “the total cost  
25 of application of technology in relation to the effluent reduction benefits to be achieved from such application, and  
26 shall also take into account the age of equipment and facilities involved, the process employed, the engineering  
27 aspects of the application of various types of control techniques, process changes, non-water quality environmental  
28 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.

<sup>564</sup> 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”).

<sup>565</sup> Permit, pp. F-96, J-12.

<sup>566</sup> See sections V-VII, *supra*, concerning filtration, nitrification, denitrification.

1 what the analysis entails, and how the review should be completed. The following steps are  
2 required:

- 3 1. Compare receiving water quality to the water quality objectives established  
4 to protect designated beneficial uses.
- 5 2. Balancing the proposed action against the public interest.
- 6 3. Report on the antidegradation analysis.

7 Unlike other recent permits issued by the Regional Board, the Permit does not include or  
8 reference an appropriate complete antidegradation analysis to support its BPTC conclusions.<sup>567</sup>  
9 Initially, it deserves emphasis that the entire “analysis” consists of a paragraph on the bottom of  
10 page F-96, various bullet points, a Table F-18 which is of almost no value (as discussed below),  
11 and two argumentative paragraphs added after the public comment period. This is far, far from  
12 the rigor that is necessary to support such dramatic outcomes.

13 The Permit includes at best a beginning of the analysis required under Step One of the  
14 guidance. Table F-18 does include a comparison of some effluent data and downstream receiving  
15 water quality below the District’s discharge to the applicable water quality objectives.<sup>568</sup>  
16 Importantly, however, it *does not perform step 1 at all* for nitrate, total coliform, or other  
17 filtration-related requirements. Moreover, the Regional Board, as discussed above, employed an  
18 entirely novel way of viewing that information rather than applying thresholds of significance  
19 consistent with recent antidegradation reviews for other dischargers. The Regional Board then  
20 left the task unfinished, omitting the second and third steps. The Regional Board did not  
21 undertake the balancing of the proposed action against the public interest as required in Step Two.  
22 Nor did the Regional Board set forth the required report, which is to include specific components  
23 and is designed to provide the transparency necessary to “ensure full intergovernmental

24 \_\_\_\_\_  
25 <sup>567</sup> The Regional Board could not rely on the District’s 2009 Expansion ADA for an analysis of the socioeconomic  
26 impacts of the Permit. The 2009 report evaluated only the impacts of advanced treatment of the SWRTP effluent to  
27 remove the increment of mass loading that would result from a proposed increase in discharge capacity from  
28 181 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.

<sup>568</sup> Permit, pp. F-98 to F-99.

1 coordination and public participation in the permitting process.”<sup>569</sup> All three steps are necessary  
 2 to ensure compliance with the state and federal antidegradation policies (i.e., is the action to the  
 3 maximum benefit of the public, and necessary to accommodate important economic or social  
 4 development in the area?). Had such an analysis been properly performed, the conclusions in the  
 5 Permit with respect to BPTC would be entirely different. The Regional Board’s analysis is  
 6 fundamentally deficient, and would not have been accepted had it been submitted by a regulated  
 7 entity.

## 8           2.       **Bullet Points Are Not Analysis**

9           In support of the assertion that the identified levels of treatment constitute BPTC, the  
 10 Permit sets forth a series of bulleted summary statements.<sup>570</sup> These bullet points are statements of  
 11 fact of varying relevance which, even if true, do not support the Regional Board’s conclusions  
 12 and “soundbite” argumentative conclusions. These purported “findings” fail to satisfy the rigor  
 13 specified in APU 90-004, which states that the antidegradation analysis should be summarized in  
 14 the fact sheet and include all of the following: water quality parameters and beneficial uses  
 15 which will be affected by the proposed action and the extent of the impact; scientific rationale for  
 16 determining the proposed action will or will not lower water quality; description of the alternative  
 17 measures that were considered; a description of socioeconomic evaluation; and the rationale for  
 18 determining that the proposed action is or is not justified by socioeconomic considerations.<sup>571</sup>

19           The first four statements in the list of bullet points are statements of fact.<sup>572</sup> The District  
 20 does not dispute the importance of the Sacramento River and the Sacramento-San Joaquin Delta,  
 21 or the fact that the Delta is an important environmental and economic resource for the state.  
 22 These four statements do not provide any evidence to suggest that the District’s existing  
 23 discharge is negatively affecting these beneficial uses, or that the proposed treatment  
 24

---

25 <sup>569</sup> APU 90-004, p. 6.

26 <sup>570</sup> Permit, pp. F-94 to F-96.

27 <sup>571</sup> APU 90-004, p. 6.

28 <sup>572</sup> See Permit, pp. F-94 to F-95.

1 requirements in the Permit are reasonable. These are merely statements of fact, and are a far cry  
2 from the analysis required by law.

3 The bullet statement that “[a]mmonia, along with BOD, from the SRWTP reduces the  
4 dissolved oxygen in the Sacramento River and Sacramento-San Joaquin Delta for nearly 40 miles  
5 below its discharge” does not lead to the conclusion that full nitrification is necessary to ensure  
6 compliance with dissolved oxygen water quality objectives.<sup>573</sup> To the extent that discharges from  
7 the SRWTP reduce dissolved oxygen in certain areas downstream of the SRWTP discharge, the  
8 Regional Board could have imposed an appropriate limit on oxygen demand that would ensure  
9 future compliance with dissolved oxygen water quality objectives under all projected critical river  
10 flow and temperature conditions. To comply with such a limit, the District would have to  
11 decrease the levels of ammonia and/or BOD in its discharge. However, full nitrification of  
12 effluent from SRWTP is not necessary to meet water quality objectives for dissolved oxygen.<sup>574</sup>

13 The bullet statement that “[t]he oxygen depleting constituents from the SRWTP use or  
14 will use all the assimilative capacity of the River and Delta leaving no assimilative capacity  
15 available to other communities that currently reduce oxygen demanding constituents by  
16 implementing advanced treatment processes,” is simply not relevant to the Permit and is highly  
17 misleading.<sup>575</sup> The District is not requesting or proposing an increase in discharge, and therefore  
18 it does not seek to use additional assimilative capacity beyond what has been permitted  
19 previously. The District agrees that a limit on oxygen demand from the SRWTP is appropriate to  
20 ensure applicable dissolved oxygen water quality objectives are met. A permit that did not  
21 require full nitrification would not consume assimilative capacity otherwise available. With  
22 regard to those facilities that discharge effluent to receiving waters either within or tributary to the  
23 Delta downstream of Rio Vista (i.e., Stockton, Galt, Tracy, Manteca, Lodi, El Dorado Hills, and  
24

---

25 <sup>573</sup> Permit, p. F-95.

26 <sup>574</sup> District’s Low Dissolved Oxygen Prevention Assessment (LDOPA 2010); see section VI, *ante*.

27 <sup>575</sup> Permit, p. F-95. The issue of assimilative capacity is also discussed in Attachment J of the Permit. The Regional  
28 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.)

1 Ironhouse), the District's far field modeling shows that SRWTP effluent comprises 0.82 - 3.53%  
 2 (99.91 percentile at a discharge rate of 181 mgd) of any given volume of water at various locations  
 3 in the Delta. It is inconceivable that a hypothetical 2% of SRWTP effluent in a volume of water  
 4 at some location in the Delta would exert such a demand on dissolved oxygen that there would be  
 5 no assimilative capacity in the receiving water for additional oxygen demanding substances  
 6 contributed by another discharger.<sup>576</sup> Further, other municipalities have not previously been  
 7 regulated based on dissolved oxygen in the Sacramento River downstream of the SRWTP and it  
 8 is highly unlikely that would occur, in part because their oxygen demand is asserted upstream.

9 With regard to ammonia, the Permit bullets assert: "The ammonia from the SRWTP  
 10 contributes to the water quality problems in the Suisun Bay"; "The ammonia from the SRWTP is  
 11 acutely and chronically toxic to species, including copepods and freshwater mussels that reside in  
 12 the Sacramento River and Sacramento-San Joaquin Delta"<sup>577</sup>; and, "Ammonia in the SRWTP  
 13 effluent combined with chlorine disinfection creates nitrosamines at levels 100 times greater than  
 14 the primary MCL. Nitrosamines are highly mutagenic and potentially carcinogenic."<sup>578</sup> Even if  
 15 all of these statements were unambiguously true, the Regional Board has the authority—and the  
 16 obligation—to adopt WQBELs to implement applicable numeric or narrative water quality  
 17 objectives to address each of these issues. But single-minded advocacy for *pre-ordained*  
 18 *treatment outcomes* is not appropriate. In the meantime, of course, the conclusions are overly  
 19 simplistic, misleading, and incorrect. The District addresses these ammonia-related issues in  
 20 detail in section VI above.

21 The Permit bullets also include a statement regarding risk of pathogenic illness that  
 22 allegedly occurs "at times."<sup>579</sup> The precise basis for the statement is uncertain, but the issue of  
 23 pathogens and health risks *is fully* addressed in section V above. The discharge causes no

24 <sup>576</sup> District's October 2010 Comments and Evidence Letter, p. 43.

25 <sup>577</sup> In the September Tentative Permit, these alleged toxic effects were characterized as possible ("ammonia from the  
 26 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.)

27 <sup>578</sup> Permit, p. F-95.

28 <sup>579</sup> Permit, p. F-95.

1 meaningful increase in risk and recreational users are clearly protected at the current level of  
2 disinfection. The Permit bullets also state that filtration will reduce levels of certain pollutants.<sup>580</sup>  
3 While this may be factually correct to some degree with regard to some of the pollutants listed,  
4 the statement is beside the point. Filtration was not proposed based on incidental removals of  
5 constituents such as copper, but on alleged protection of the recreation use. Nor has any  
6 antidegradation analysis at all been provided for the other constituents such as BOD or TSS.  
7 Thus, this bullet point provides no support for establishing filtration as BPTC.

8 The bullet points also include the sweeping statement that “[r]eduction or elimination of  
9 ammonia, nitrate and protozoans will reduce impacts to the beneficial uses of the Sacramento  
10 River and Sacramento-San Joaquin Delta from the SRWTP discharge.” The Permit provides no  
11 evidence that, in fact, advanced treatment of the SRWTP discharge provides tangible or definite  
12 benefits or otherwise leads to improved attainment of beneficial uses. As discussed in section V  
13 above, the facts indicate that there is no discernible benefit in the highly costly filtration  
14 requirements, and they are not reasonable. With regard to a determination of BPTC, in  
15 consideration of the dilution provided in the receiving water, the *de minimis* nature of risk posed  
16 by the current discharge, and the costs (economic, environmental, and otherwise), the current  
17 level of treatment at the SRWTP provides BPTC.

18 The last two bullets in the Permit are apparently designed to bolster the conclusion that the  
19 treatment requirements proposed are the same as those of other similarly situated dischargers.<sup>581</sup>  
20 As discussed below, the information presented does not represent a comparison to “other  
21 similarly situated dischargers,” and therefore the statements are without support.

22 The Regional Board concluded that an antidegradation analysis was required for the  
23 District’s existing discharge due to changes in downstream conditions.<sup>582</sup> Even assuming the  
24 analysis was required, the Regional Board had an obligation to conduct the analysis required

25 <sup>580</sup> Permit, p. F-95.

26 <sup>581</sup> Permit, p. F-96; see State Board Order WQ 2000-07, *supra*, pp. 10-11 (“One factor to be considered in  
27 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.”).

28 <sup>582</sup> Permit, p. F-93.

1 under state and federal policy and guidance. The page of bullet points set forth as findings falls  
 2 far short of the requirement that the Regional Board articulate “[t]he scientific *rationale* for  
 3 determining that the proposed action will or will not lower water quality” and the “*rationale* for  
 4 determining that the proposed action is or is not justified by socioeconomic considerations.”<sup>583</sup>

5 **3. The Regional Board Did Not Conduct the Required Balancing of**  
 6 **Socioeconomic Impacts and Water Quality Benefits**

7 When determining if an increased load of a pollutant to a high quality water should be  
 8 allowed, the Regional Board must determine if the discharge is necessary to accommodate social  
 9 or economic development and is consistent with maximum public benefit.<sup>584</sup> In making such a  
 10 determination, State Board guidance specifies several factors to be considered, including  
 11 “[e]conomic and social costs, tangible and intangible, of the proposed discharge compared to  
 12 benefits.”<sup>585</sup> The economic impacts to be considered include those affecting such parameters as  
 13 housing, employment, and income.<sup>586</sup> These impacts are weighed against the benefits to be  
 14 obtained by requiring the expenditures.

15 <sup>583</sup> APU 90-004, p. 6, emphasis added.

16 <sup>584</sup> Where the federal antidegradation policy applies, Resolution No. 68-16 incorporates the tests from the federal  
 17 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.)

18 <sup>585</sup> APU 90-004, p. 5. The factors are:

- 19 a. Past, present, and probable beneficial uses of water.
- 20 b. Economic and social costs, tangible and intangible, of the proposed discharge compared to  
 21 benefits. The economic impacts to be considered are those incurred in order to maintain existing water  
 22 quality. The financial impact analysis should focus on the ability of the facility to pay for the necessary  
 23 treatment. The ability to pay depends on the facility’s source of funds. In addition to demonstrating a  
 24 financial impact on the publicly- or privately-owned facility, the analysis must show a significant adverse  
 25 impact on the community. The long-term and short-term socioeconomic impacts of maintaining existing  
 26 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.
- 27 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  
 28 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.)

<sup>586</sup> APU 90-004, p. 5.

1 Here, no increased load of pollutants was permitted. To the extent that the Regional  
 2 Board nonetheless judged an antidegradation analysis to be proper, the Regional Board must  
 3 determine whether the cost (and impacts to the region) of full nitrification, full denitrification, and  
 4 equivalent of Title 22 filtration are outweighed by the benefits to be realized and thus constitute  
 5 BPTC for the discharge. Specifically, the Regional Board must find that the proposed  
 6 requirements do not unduly impact social and economic development and are to the maximum  
 7 benefit to the people of the state.

8 a. **The Regional Board's Consideration of Socioeconomic Impacts Was**  
 9 **Superficial and Deficient**

10 In conducting an antidegradation review, the Regional Board is to consider "[e]conomic  
 11 and social costs, tangible and intangible, of the proposed discharge compared to benefits."<sup>587</sup> The  
 12 State Board has provided guidance, in other contexts, as to what is required to meaningfully  
 13 consider economics.<sup>588</sup> A regional board should review currently available information and  
 14 "consider, and respond on the record, to any information provided by dischargers or other  
 15 interested persons regarding the potential cost implications . . . ."<sup>589</sup> The information necessary to  
 16 conduct the requisite comparison of costs and benefits for antidegradation review was available to  
 17 the Regional Board at the time the Permit was adopted. A technical memorandum, *Analysis of*  
 18 *Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater*  
 19 *Treatment Plant (Cost/Benefits Analysis)*, was submitted to the Regional Board in May 2010.  
 20 This analysis evaluated the cost of implementing five advanced treatment trains and the changes  
 21 in downstream water quality that these treatment trains could achieve. The report evaluated full  
 22 nitrification, full denitrification, filtration, and UV disinfection, as well as reverse osmosis,  
 23 ozone/peroxide oxidation, and combinations of these various treatment processes, and concluded

24  
 25 <sup>587</sup> APU 90-004, p. 5.

26 <sup>588</sup> Attwater Memorandum, p.5.

27 <sup>589</sup> Attwater Memorandum, p. 5. While this guidance was focused on the analysis to support water quality objectives,  
 28 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. Vasey to Stefan Lorenzato, October 27,  
 1999.)

1 that the high costs associated with the implementation of advanced treatment of SRWTP  
 2 secondary treated effluent discharged at the once proposed rate of 218 mgd are disproportionate  
 3 to the water quality benefits that may be observed in downstream receiving waters with  
 4 implementation of advanced treatment.<sup>590</sup> The report found that the change in downstream water  
 5 quality that would be realized from implementation of advanced treatment at SRWTP was not  
 6 commensurate with the cost of advanced treatment even at the higher discharge volume.<sup>591</sup> Given  
 7 the minor, and in some cases immeasurable reductions in downstream receiving water constituent  
 8 concentrations that would result from the advanced treatment train alternatives, the high capital  
 9 and total annual costs of implementation of advanced treatment were found to be  
 10 disproportionate.

11 In addition, a study prepared by the University of the Pacific (UOP) evaluated the  
 12 socioeconomic impacts of implementing nutrient removal for a SRWTP discharge rate of  
 13 181 mgd, and found that nutrient removal of the SRWTP discharge is estimated to lead to an  
 14 annual income loss of \$94.4 million and an annual employment loss of 390 jobs in the District's  
 15 service area, which covers most of Sacramento County.<sup>592</sup> While the Permit makes passing  
 16 reference to studies having been "considered," the Permit does not describe the findings of these  
 17 studies and state why they are, or are not, relevant or accurate.<sup>593</sup> There was also substantial

18 <sup>590</sup> Cost/Benefits Analysis, p. 5-2. As noted, the District withdrew its request to increase the SRWTP capacity from  
 19 181 mgd to 218 mgd. The increment of pollution reduction due to implementation of advanced treatment of a  
 20 181 mgd discharge would be even smaller than the increment in pollution reduction modeled for a 218 mgd  
 discharge.

21 <sup>591</sup> Cost/Benefits Analysis, p. XII.

22 <sup>592</sup> Michael, Dr. Jeffrey, Pogue, Dr. Thomas, Business Forecasting Data, Eberhardt School of Business UOP,  
 23 Advanced Wastewater Treatment for Nutrient Reduction: Impact on Sacramento Income and Employment (Aug. 23,  
 24 2010) (UOP Study), p. 8. The UOP Study that is in the record (see Hearing Transcript p. 253:7-16 [second UOP  
 25 Study was released after public comment period]) is limited to the impacts of nutrient removal, which is considered  
 26 to consist of NTF, FBR, and two new pumping stations for a flow rate of 181 mgd. The UOP Study does not include  
 27 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.

28 <sup>593</sup> 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

1 testimony by others of the significant economic impacts to the region. The North State Building  
 2 Industry Association submitted a report detailing the drastic impact of the increased connection  
 3 fees on development in the region.<sup>594</sup> Campbell's Soup and other area businesses provided  
 4 compelling testimony regarding the effects of increased sewer rates on their ability to remain in  
 5 business, and residents addressed the personal hardship that the unprecedented rate increases  
 6 would have on their families.<sup>595</sup>

7 The Permit does not make any specific findings about the expected cost of compliance.  
 8 The Regional Board did not refute the District's analyses, nor identify countervailing  
 9 considerations, but simply concluded that even a \$2 billion cost is reasonable because: (1) other  
 10 dischargers have incurred significant costs; and (2) "failure to implement tertiary filtration,  
 11 nitrification, and denitrification *may result or will likely result* in an adverse impact to the REC-1,  
 12 municipal and domestic water supply, aquatic life, and agricultural beneficial uses."<sup>596</sup> These  
 13 possible adverse impacts are purely speculative, and are not supported in the Permit. Clearly, the  
 14 Regional Board was not to be deterred from its course of requiring particular treatment without  
 15 regard to either the magnitude of the costs or theoretical nature of the presumed benefits.

16 **b. The Cost Information Related to Other Dischargers Is Biased, Suspect,  
 17 and Misleading**

18 The sum of the Regional Board's inquiry into the reasonableness of the costs of  
 19 implementing the Permit is set forth in Table F-17 of the Permit, which is titled "Per Capita Costs  
 20 of Tertiary Upgrades." The information in Table F-17 is presented without reference to its source

---

21 relied upon or why it considered one evaluation to be more relevant than another. (See Memorandum dated  
 22 August 13, 2010, to Kathleen Harder, Regional Board, from PG Environmental, LLC, Subject: Technical Review of  
 23 Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant; Memorandum dated  
 24 August 18, 2010, to Kathleen Harder, Regional Board, from PG Environmental, LLC, Subject: Technical Review of  
 25 Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant; Technical  
 26 Memorandum, Trussell Technologies, Ammonia Removal Cost Alternatives for the Sacramento Regional  
 27 Wastewater Treatment Plant (May 31, 2010); Trussell October 1 Letter; see section IV above regarding Cost  
 28 Considerations.)

<sup>594</sup> Economic Planning Systems, Inc., Sacramento County Regional Sanitation District Potential Fee Increase Analysis (October 8, 2010); Hearing Transcript, pp. 333:7-335:8.

<sup>595</sup> 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.

<sup>596</sup> Permit, p. F-97, emphasis added.

1 or citation to evidence in the record. First, the Permit states in a footnote that the Table is based  
 2 on a “telephone survey.”<sup>597</sup> There *was no* formal survey conducted. Rather, Regional Board staff  
 3 selected and called certain specific municipal dischargers for information.<sup>598</sup> Regional Board staff  
 4 did not speak to representatives of each of the entities listed, and in some instances staff provided  
 5 the information in Table F-17 for a discharger without even having spoken to anyone affiliated  
 6 with the discharger at all. There is no indication, anywhere, of what questions were asked, what  
 7 the specific answers were, why these individual entities were chosen for “surveying,” or why they  
 8 might be “similarly situated” to the District. Further, assuming that the goal of the so-called  
 9 “survey” was in some way to gather information regarding the costs of compliance with post-  
 10 secondary treatment, an objective survey that included a truly representative sample would have  
 11 revealed the answer to be *zero* for many municipal dischargers who are permitted to discharge  
 12 secondary effluent. The purported survey identifies a “per capita” cost that is not based on  
 13 appropriate information, such as costs that have actually been incurred, financing methods,  
 14 allocation among existing, new, and industrial users, or other factors that would affect the actual  
 15 costs to residents, or the actual impacts in the specific community under consideration.

16 Still further, a notable change occurred in Table F-17 after the September Tentative  
 17 Permit. The title of Table F-17 (which was formerly F-18 in the September Tentative Permit) is  
 18 “Per Capita Costs for Tertiary Upgrades.” But the heading *within* Table F-17 itself was *changed*,  
 19 from “Tertiary Conversion Cost” to “Upgrade and Expansion Costs.”<sup>599</sup> The District submits that  
 20 “upgrade and expansion” means something quite different than “tertiary conversion.” For  
 21 example, the District’s estimated costs do not include expansion.

22 <sup>597</sup> Permit, p. F-96.

23 <sup>598</sup> The September Tentative Permit contained a version of the same table. (September Tentative Permit, p. F-93.)  
 24 Subsequent to the issuance of the September Tentative Permit, District representatives visited the Regional Board on  
 25 September 21, 2010, to, among other things, acquire the survey or information regarding the survey. As of  
 26 September 21, 2010, the only information available in any way related to the survey was an electronic mail response  
 27 from Larry Parlin with the City of Stockton and an Excel file that replicated Table F-17. (District’s October 2010  
 28 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.)

<sup>599</sup> See November Redline Tentative Permit, p. F-96; Permit, p. F-96.

1 Several of the entities represented in Table F-17 disagreed with the inclusion of the  
 2 information in the Permit in written comments that are part of the Permit record.<sup>600</sup> The City of  
 3 Roseville's representative, Art O'Brien, stated that the information in Table F-17 did not  
 4 accurately reflect his conversation with Regional Board staff and that it was not possible to isolate  
 5 tertiary treatment costs from other improvements.<sup>601</sup> He also made clear that tertiary treatment  
 6 was required as a result of a master plan EIR and, at Roseville's Deer Creek plant, the upgrade  
 7 was associated with an expansion in discharge volume.<sup>602</sup> Mr. O'Brien requested that Table F-17  
 8 be deleted or, at a minimum, the references to the City of Roseville be removed.

9 Similarly, the City of Vacaville noted that the \$150 million in costs identified for  
 10 Vacaville includes all plant upgrades, such as construction of storage to eliminate bypass and  
 11 demolition of outdated facilities.<sup>603</sup> Vacaville's letter also emphasized that far from considering  
 12 these costs to be reasonable, Vacaville views them as an extraordinary expenditure for  
 13 improvements that will yield "minimal Delta water quality benefit."<sup>604</sup> As for Ironhouse Sanitary  
 14 District (ISD), which was issued a permit for a new discharge to the Delta, their letter makes clear  
 15 that:

16 In ISD's case, the \$54.5 million is the total cost of constructing an entirely new  
 17 treatment facility along with major influent and effluent piping and new river  
 18 outfall to meet all permit requirements for a new surface water discharge—not an  
 19 incremental cost for upgrading an existing secondary treatment facility to tertiary.  
 20 There is concern that listing this cost figure in a column headed "tertiary  
 21 conversion costs" is misleading and may result in "apples to oranges"  
 22 comparisons.<sup>605</sup>

23 It is clear that even the selective, perfunctory analysis conducted by the Regional Board is  
 24 unreliable and cannot be deemed to constitute a socioeconomic analysis as required under the

25 <sup>600</sup> Though four entities requested that Table F-17 be deleted, or at a minimum, the information relating to their  
 26 facilities be deleted, only the City of Davis was removed from Table F-17 in the final Permit. (November Redline  
 27 Tentative Permit, p. F-96.)

28 <sup>601</sup> Letter dated September 22, 2010, to Kathy Harder, Regional Board, from Art O'Brien, City of Roseville.

<sup>602</sup> Letter dated September 22, 2010, to Kathy Harder, Regional Board, from Art O'Brien, City of Roseville.

<sup>603</sup> Letter dated October 8, 2010, to Kathleen Harder, Regional Board, from David K. Tompkins, City of Vacaville.

<sup>604</sup> Letter dated October 8, 2010, to Kathleen Harder, Regional Board, from David K. Tompkins, City of Vacaville.

<sup>605</sup> Letter dated October 5, 2010, to Kathleen Harder, Regional Board, from Jennifer Skrel, Ironhouse Sanitary  
 District.

1 antidegradation policies.<sup>606</sup> Thus, the Regional Board should not have relied on this information  
2 to determine BPTC for the District's discharge.

3 **c. The District's Situation Is Not Similar to Other Dischargers Cited in**  
4 **the Permit**

5 Among the factors to be considered in determining BPTC for a particular discharge are  
6 "methods used by other similarly situated dischargers."<sup>607</sup> As noted above, the socioeconomic  
7 component of Regional Board's BPTC analysis consists of merely a table comparing the per  
8 capita costs of implementing the Regional Board's desired treatment train to those of other  
9 allegedly similarly situated communities.<sup>608</sup> Following the table, the Permit states that economic  
10 and socioeconomic studies provided by the District and other parties were considered and  
11 concludes that even if the cost to implement the Permit is \$2 billion, the resulting monthly sewer  
12 service charge of \$60 is reasonable because:

13 (1) many communities discharging to surface waters pay substantially more for  
14 sewer service; and (2) the increased sewage treatment rate of \$60 per month may  
15 be overestimated given that other large communities in the Sacramento/ Delta area  
16 that [sic] have already upgraded their treatment facilities to advanced treatment  
17 also similar to that proposed in these waste discharge requirements have sewer  
18 fees substantially less than the monthly fees projected by the Sacramento Regional  
19 County Sanitation District, including the Cities of Stockton, Roseville, Tracy, and  
20 Lodi.<sup>609</sup>

21 This "analysis" is not only overly simplistic, but fatally flawed on multiple levels. First of  
22 all, these dischargers are not all similarly situated to the District. The District's "situation" is as  
23 follows: it discharges treated effluent from a multipoint diffuser lying on the bottom of the largest  
24 river in California. The Sacramento River flow provides very considerable dilution of the  
25 effluent in the immediate receiving water. In such situations, the Regional Board has not required  
26 filtration, as described in section V. In addition, the Regional Board typically grants mixing

25 <sup>606</sup> The superficiality of these comparisons was demonstrated by District Engineer Stan Dean during his hearing  
26 testimony. (Hearing Transcript, pp. 224:4-225:7; see also section IV of this Statement of Points and Authorities.)

27 <sup>607</sup> State Board Order No. WQ 2000-07, *supra*, p. 12.

28 <sup>608</sup> Permit, p. F-96.

<sup>609</sup> Permit, p. F-97.

1 zones.<sup>610</sup> None of the named entities discharges directly to the Sacramento River. The cities of  
 2 Manteca and Stockton discharge to the San Joaquin River, which has very different ambient water  
 3 quality, flows, and other characteristics.<sup>611</sup> Most of the examples provided are POTWs that  
 4 discharge to effluent dominated waterways (small creeks and sloughs) where dilution does not  
 5 occur during critical low flow periods (e.g., Roseville, Lodi, Woodland, and Vacaville).<sup>612</sup>  
 6 Absent the end-of-pipe effluent limitations, which drive the high treatment costs, these entities  
 7 would have been considered to use more than 100% of the assimilative capacity of their  
 8 immediate receiving waters for various relevant pollutants, a situation vastly different than that of  
 9 the District.<sup>613</sup> ISD discharges seasonally to the San Joaquin River in the western Delta, and  
 10 applies recycled water in the summer months to adjacent agricultural lands.<sup>614</sup> For its discharge to  
 11 the San Joaquin River, ISD is considered a “new discharger.”<sup>615</sup> It elected to propose treatment  
 12 beyond secondary treatment for its “new” discharge to the Delta, approved in 2008.<sup>616</sup>

13 In comparison, the cities of Yuba City, Corning, and Chico all discharge to mainstem  
 14 rivers tributary to the Delta where significant dilution is available.<sup>617</sup> For these cities, the  
 15 Regional Board has adopted effluent limits that are consistent with secondary treatment standards  
 16 and do not require implementation of filtration, nitrification, or denitrification.<sup>618</sup> Further, the  
 17 Regional Board has found that compliance with these secondary treatment requirements will  
 18 result in “the use of best practicable treatment or control of the discharge.”<sup>619</sup> Given the concerns

19 <sup>610</sup> See sections VI and VII, *supra*, IX, *post*; and District’s October 2010 Comments and Evidence Letter, pp. 78-88.

20 <sup>611</sup> See District’s October 2010 Comments and Evidence Letter, p. 74.

21 <sup>612</sup> See District’s October 2010 Comments and Evidence Letter, p. 74.

22 <sup>613</sup> See District’s October 2010 Comments and Evidence Letter, p. 74.

23 <sup>614</sup> See District’s October 2010 Comments and Evidence Letter, p. 75.

24 <sup>615</sup> See District’s October 2010 Comments and Evidence Letter, p. 75.

25 <sup>616</sup> See District’s October 2010 Comments and Evidence Letter, p. 75.

26 <sup>617</sup> See District’s October 2010 Comments and Evidence Letter, p. 75.

27 <sup>618</sup> See Order No. R5-2010-0080 (City of Corning), p. 11; see also Order No. R5-2010-0019 (City of Chico), p. 11;  
 28 see also Order No. R5-2007-0134-01, *supra* (Yuba City), p. 11.

<sup>619</sup> 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.

1 expressed in the Permit for ecosystem effects in Suisun Bay and recreational impacts in the near  
 2 field, deep water dischargers to San Francisco Bay (including Central Contra Costa Sanitary  
 3 District, Delta Diablo Sanitation District, East Bay Dischargers Authority, East Bay Municipal  
 4 Utility District, and the City and County of San Francisco) *are* similarly situated to the SRWTP.  
 5 These large municipal facilities are all permitted by the San Francisco Bay Regional Water  
 6 Quality Control Board to discharge secondary effluent to the Bay or Delta *without nitrification*.<sup>620</sup>

7 A theme of the Permit and related documents is that other “large” dischargers in the  
 8 “Delta” have been required to implement advanced treatment, so the District should too.<sup>621</sup> This  
 9 is overwhelmingly simplistic and misleading. Other dischargers in the Delta have been issued  
 10 WQBELs based on the effects of the discharge on immediate receiving waters and consideration  
 11 of applicable policies. This practice is applicable throughout the Central Valley region and  
 12 should apply to the District.

13 Moreover, the Regional Board is by its own admission regulating the District differently  
 14 from the communities it has identified as comparable. In the District’s Permit, the Regional  
 15 Board applied a different approach to antidegradation, the granting (or denial) of dilution credits,  
 16 and the application of water quality standards for ammonia, nitrate, and pathogens.

17 The “Delta” as referenced by the Regional Board is presumably the triangle drawn by the  
 18 legislature in Water Code section 12220. It is as arbitrary to base effluent limitations on location  
 19 within this triangle as it would be to have limitations based on the boundaries of San Joaquin  
 20 County (which also encompass Lodi, Stockton, Manteca, and Tracy). Indeed, very little of the  
 21 District is in the Delta and SRCSD could theoretically move its diffuser somewhat, such that the  
 22 diffuser would not be located in “the Delta.” If this occurred, should this affect the requirements  
 23 properly imposed on the District? Obviously not. Nor should the District’s location at the top of  
 24 the “Delta” triangle serve to justify requirements not otherwise justified.

25  
 26 \_\_\_\_\_  
 27 <sup>620</sup> 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).

28 <sup>621</sup> Permit, p. F-97; Staff Response to Comments, p. 44.

1 As discussed previously, the Regional Board required filtration for Lodi, Stockton,  
 2 Manteca, and Tracy as a result of application of the 20:1 policy, finding insufficient dilution.<sup>622</sup>  
 3 Similarly, these municipalities' WQBELs requiring nitrification and denitrification (other than  
 4 Stockton, which has no denitrification requirement) are driven by the conditions of discharge to  
 5 the immediate receiving water. Consistent application of these policies and reasoning to this  
 6 Permit would not result in a requirement for advanced treatment.

7 The Regional Board based the ammonia effluent limitations in the recently issued permits  
 8 for Manteca, Lodi, Tracy, and Stockton on the U.S. EPA's National Ambient Water Quality  
 9 Criteria (NAWQC) for the protection of aquatic life when salmonids and early life stages are  
 10 present.<sup>623</sup> None of these dischargers were subject to effluent limitations based on "recent  
 11 studies," anticipated but not yet published U.S. EPA criteria revisions, the speculation that their  
 12 discharges *may have* effects on diatoms, or other hypotheses.<sup>624</sup>

13 With regard to dilution, the Manteca discharge occurs through a 36-inch diameter pipe  
 14 located on a side bank, which the Regional Board found provides minimal dilution.<sup>625</sup> The  
 15 discharge is to a tidally influenced section of the San Joaquin River, which experiences flow  
 16 reversals and prolonged near-slack water conditions under low flow conditions.<sup>626</sup> In addition, the  
 17 modeling and field studies for acute and chronic aquatic criteria demonstrated that there is limited  
 18 dilution within the immediate vicinity of the outfall (acute) and 4,100 feet north of the outfall  
 19 (chronic).<sup>627</sup> In the absence of additional information, the Regional Board determined that it was  
 20 not appropriate to allow a mixing zone nor grant dilution credits for acute aquatic criteria.<sup>628</sup>

21  
 22  
 23 <sup>622</sup> See section V, *supra*.

24 <sup>623</sup> 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.

25 <sup>624</sup> Permit, pp. J-5 to J-7.

26 <sup>625</sup> Manteca Permit, p. F-31.

27 <sup>626</sup> Manteca Permit, p. F-31.

28 <sup>627</sup> Manteca Permit, pp. F-31 to F-32.

<sup>628</sup> Manteca Permit, pp. F-31 to F-32.

1           The Lodi Permit denies dilution credits in part because the receiving water is a tidally  
2 influenced dead end slough, a quiescent water body with minimal dilution within the vicinity of  
3 the discharge.<sup>629</sup> The Lodi Permit denies dilution credits because Lodi did not provide sufficient  
4 information for the Regional Board to determine a mixing zone that will not adversely impact  
5 beneficial uses.<sup>630</sup> Similarly, Tracy was denied dilution due to insufficient data to provide design  
6 flow for evaluating dilution for the acute and chronic aquatic life criteria; the tidal cycle, slack  
7 tide, and critical dry years, which can result in no flow being available for dilution; the receiving  
8 water being limited in size; multiple dosing of effluent into the receiving water; and the receiving  
9 water being identified as a “Toxic Hot Spot” under the Bay Protection and Toxic Hot Spot  
10 Cleanup Program.<sup>631</sup> These situations are manifestly different from the District’s, in terms of both  
11 the physical discharge using a diffuser at the bottom of the river and the receiving water into  
12 which the effluent is discharged.

13           With regard to Stockton, the Regional Board found that tidal action, river flow stagnation,  
14 and negative flow rates cause low flow conditions in the receiving waters resulting in little to no  
15 dilution and multiple doses of the effluent.<sup>632</sup> Therefore, and due to the impaired condition of the  
16 San Joaquin River, presence of endangered species, and uncertainty of the reliability and accuracy  
17 of a “Box Model” study of the discharge and receiving water, the Regional Board did not grant  
18 dilution credits for the acute and chronic aquatic life criteria.<sup>633</sup> However, where there was  
19 dilution for the municipal beneficial use, the Regional Board granted dilution credits for nitrate.

20           Indeed, Regional Board staff informed the Regional Board that the Permit is a departure  
21 from normal permitting practices: “Normally, we are looking at impacts in the immediate  
22 vicinity of the discharge. In this case, this permit is addressing ecosystem concerns all the way  
23  
24

---

25 <sup>629</sup> Lodi Permit, p. F-20.

26 <sup>630</sup> Lodi Permit, p. F-20.

27 <sup>631</sup> Tracy Permit, pp. 4, F-22 to F-24, F-31.

28 <sup>632</sup> Stockton Permit, pp. F-18 to F-19.

<sup>633</sup> Stockton Permit, p. F-19.

1 down from about 50 miles along the entire length of the Sacramento River downstream of the  
2 discharge into and including in [sic] Suisun Bay . . . .”<sup>634</sup>

3 In other words, the Regional Board characterized the District’s discharge as similar for  
4 purposes of comparing costs but different for purposes of application of regulations and policy,  
5 mixing zone determinations, and calculation of effluent limitations. The inescapable conclusion  
6 is that the Permit issued by the Regional Board attempts to have it both ways in order to arrive at  
7 a pre-determined destination.

8 **d. The Regional Board Did Not Adequately Consider Feasible**  
9 **Alternatives**

10 The Regional Board should have evaluated the “implementation of feasible alternative  
11 control measures which might reduce, eliminate, or compensate for negative impacts of the  
12 proposed action.”<sup>635</sup> In addition to declining to assess the social and economic impacts on the  
13 Sacramento region, the Regional Board failed to consider the implementation of feasible  
14 alternative control measures that might counteract any alleged negative impacts of the District’s  
15 discharge. This shortcoming was pointed out in the District’s comments on the September  
16 Tentative Permit, and in response, the Regional Board added the following to the Fact Sheet:

17 Various alternative measures, including those alternatives provided as part of the  
18 proposed waste discharge requirements, have been considered. After considering  
19 the alternatives, these waste discharge requirements which implement Title 22 (or  
20 equivalent) tertiary filtration, nitrification and denitrification will result in the best  
21 practicable treatment or control of the discharge necessary to assure that a  
22 pollution or nuisance will not occur and the highest water quality consistent with  
23 maximum benefit to the people of the State will be maintained.<sup>636</sup>

24 State Board guidance specifies that the Regional Board must include a “description of the  
25 alternative measures that were considered.”<sup>637</sup> The Regional Board must do more than simply  
26 claim that it has “considered” other alternatives. The Regional Board must actually identify the

24 <sup>634</sup> Hearing Transcript, pp. 70:21-71:4. While SRCSD does not dispute that the Regional Board can consider areas  
25 downstream, the point here is that comparison of this Permit to permits of other Delta dischargers is an apples-and-  
26 oranges comparison. Further, of course, any QBELs based on far field conditions must be justified. Here, the  
27 QBELs are not.

26 <sup>635</sup> APU 90-004, p. 5.

27 <sup>636</sup> Permit, p. F-96.

28 <sup>637</sup> APU 90-004, p. 6.

1 information in the record that was reviewed, and “bridge the analytic gap” linking the evidence to  
 2 its ultimate conclusion.<sup>638</sup> Neither the Permit nor other supporting documents, such as an  
 3 Antidegradation Report or even the Response to Comments, set forth the alternatives considered  
 4 or the analysis. Therefore this statement, standing alone, is not sufficient to discharge the  
 5 Regional Board’s duty to consider alternatives.<sup>639</sup>

6 Had the Regional Board given due consideration to alternatives, it would have determined  
 7 that full nitrification is not necessary to protect beneficial uses in the Sacramento River and the  
 8 Delta. The Regional Board could reasonably find that removal of some additional amount of  
 9 oxygen demanding material (presumably ammonia and BOD) from the effluent is necessary to  
 10 ensure future compliance with dissolved oxygen standards and protect beneficial uses.<sup>640</sup> As  
 11 discussed in section VI, however, full nitrification is another matter.

12 The Regional Board also failed to properly evaluate the requirement for the equivalent of  
 13 Title 22 filtration. Although filtration is an available technology, its application to the District’s  
 14 discharge at the SRWTP is neither practicable, reasonable or necessary. As discussed in  
 15 section V, the Sacramento River upstream of the SRWTP discharge does not meet Title 22  
 16 tertiary standards. Treating SRWTP effluent to Title 22 tertiary standards will not bring the  
 17 Sacramento River downstream of the SRWTP discharge into compliance with Title 22 tertiary  
 18 standards. In fact, because the focus is on evaluating the effect of a proposed action on “high  
 19 quality” water, if 2.2 MPN/100 ml is the benchmark (Title 22 tertiary equivalent), the receiving  
 20 water is not “high quality” and Resolution No. 68-16 does not apply. Further, as previously  
 21 explained, the benefits to water quality from requiring filtration are *de minimis* and not  
 22 commensurate with the cost of building and operating these treatment facilities. Nor does the

23  
 24  
 25 <sup>638</sup> *Topanga, supra*, 11 Cal.3d, p. 515.

26 <sup>639</sup> For an example of the level of detail the Regional Board has set forth in permits for other dischargers, see Order  
 27 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.)

28 <sup>640</sup> See section VI, *supra*.

1 Permit include any findings as to why the proposed treatments are necessary to assure that  
2 pollution or nuisance will not occur.<sup>641</sup>

3 The Regional Board did not properly assess the feasibility and effectiveness of alternative  
4 control measures in improving water quality as required by State Board guidance. Thus, the  
5 conclusion that the Permit implements BPTC cannot be sustained.

6 **E. The Absence of Environmental and Public Health Benefits Renders the Challenged**  
7 **Permit Requirements Unreasonable**

8 The Regional Board cannot rely on Resolution No. 68-16 to support requirements  
9 designed to reverse past-permitted changes in water quality. The State Board has made clear  
10 “[r]esolution No. 68-16 is not a ‘zero-discharge’ standard but rather a policy statement that  
11 existing quality be maintained when it is *reasonable* to do so.”<sup>642</sup> Moreover, even if the state  
12 antidegradation policy arguably could be stretched to encompass the District’s circumstances, the  
13 policy may not be read in isolation and does not absolve the Regional Board of its statutory  
14 obligations under Porter-Cologne.

15 The requirements imposed in the Permit in the name of antidegradation are unreasonable  
16 and conflict with the general policies of Porter-Cologne. The State Board has declared “[t]he  
17 resolution is consistent with state statutes,” including Water Code section 13000.<sup>643</sup> Water Code  
18 section 13000 provides that “activities and factors which may affect the quality of the waters of  
19 the state shall be regulated to attain the highest water quality which is *reasonable*, considering all  
20 demands being made and to be made on those waters and the total values involved, beneficial and  
21 detrimental, economic and social, tangible and intangible.”<sup>644</sup> To comply with the reasonableness  
22 requirements of Porter-Cologne and Resolution No. 68-16, the Regional Board would have to  
23 find, based on evidence in the record, that requiring nitrification, denitrification, and the  
24 equivalent of Title 22 filtration with ultraviolet light or chlorine disinfection is reasonable. The

25 <sup>641</sup> “Pollution” means an alteration of water quality to a degree that unreasonably affects beneficial uses, or facilities  
26 which serve the beneficial uses. (Wat. Code, § 13050(1).) No evidence supports a finding of pollution or nuisance.

27 <sup>642</sup> State Board Order No. WQ 86-8, p. 29, emphasis added.

28 <sup>643</sup> State Board Order No. WQ 86-8, p. 29.

<sup>644</sup> Wat. Code, § 13000, emphasis added.

1 sparseness of the Regional Board's "analysis" to support a finding of reasonableness is hardly  
 2 surprising, in light of overwhelming evidence in the record that the requirements for advanced  
 3 treatment are unwarranted.

4 The treatment requirements identified as BPTC in the Permit would cost the Sacramento  
 5 region over \$2 billion. This would equate to an approximate 309% increase in monthly  
 6 residential sewer rates for existing ratepayers, an approximate 464% increase for in-fill  
 7 development fees, and an approximate 470% increase for new development fees.<sup>645</sup> The  
 8 socioeconomic impacts of the increased costs for existing and new ratepayers would  
 9 understandably be significant.<sup>646</sup> In contrast, based on uncontroverted evidence in the record, the  
 10 environmental benefit is negligible, nonexistent, or at most speculative for nearly every measured  
 11 parameter in the District's discharge. The District does not dispute that some level of ammonia  
 12 load reduction will help to ensure that the dissolved oxygen objective in the Delta is met even in  
 13 exceptionally dry years.<sup>647</sup> The issues pertaining to dissolved oxygen can be resolved through  
 14 implementation of reductions in oxygen demand as a separate requirement of the Permit. With  
 15 this single exception, however, the record shows that the District's actual impact to water quality  
 16 is not significant and does not cause or contribute to an exceedance of any water quality objective  
 17 in the Sacramento River outside the boundaries of a well-defined, small, and approvable mixing  
 18 zone.

19 The Permit attributes—or at least hypothesizes—that additional benefits will accrue as a  
 20 result of requiring the District to fully nitrify its effluent. As fully detailed elsewhere in this  
 21 document, these asserted benefits are nonexistent, *de minimis*, and/or speculative, with many  
 22 asserted benefits based on unproven research hypotheses.<sup>648</sup> Benefits that will accrue from  
 23

24 <sup>645</sup> The percent increases are based on estimated rates and fees calculated from planning level estimates, as discussed  
 25 in section IV, above. The specific rates and fees to be paid by District customers would depend on treatment  
 26 technologies employed to achieve compliance with all new requirements, but the planning level costs are  
 27 representative.

28 <sup>646</sup> See section IV, *supra*.

<sup>647</sup> District's October 2010 Comments and Evidence Letter, pp. 40-43; see section VII, *supra*.

<sup>648</sup> See section VI, *supra*.

1 denitrification are equally uncertain.<sup>649</sup> The Permit fails to explain how requiring the District to  
 2 meet the MCL at the end-of-pipe in a discharge to the Sacramento River will protect customers of  
 3 downstream drinking water agencies many miles away. The alleged benefits of the tertiary  
 4 treatment requirements are not merely speculative—they simply do not exist.<sup>650</sup> The pathogen  
 5 reductions called for in the Permit are intended to protect downstream water suppliers,  
 6 agricultural irrigators, and recreational users of the river.<sup>651</sup> As discussed in detail elsewhere, the  
 7 uncontroverted evidence in the record is that all of these uses are protected with current levels of  
 8 treatment and disinfection.

9 The Regional Board also failed to consider the adverse environmental impacts associated  
 10 with the Permit requirements. Advanced wastewater treatment processes produce environmental  
 11 impacts in the forms of increased power consumption, associated increases in greenhouse gas  
 12 emissions, and “cross media impacts.” Cross media impacts are the interrelated effects caused by  
 13 removal of a constituent from one medium and its transfer to one or more other media.  
 14 Microfiltration results in the transfer of constituents from wastewater into biosolids, air, and/or  
 15 concentrated waste streams. Depending on regulatory limits, additional treatment of the  
 16 biosolids, air, and/or concentrated waste streams may be required. While the monetary costs of  
 17 advanced treatment implementation were estimated, the associated environmental impacts of  
 18 advanced treatment due to increased power consumption and cross media impacts were not given  
 19 due consideration by the Regional Board. The operation of each advanced treatment process  
 20 would increase electricity consumption and thus greenhouse gas emissions above those generated  
 21 by existing SRWTP secondary treatment processes.<sup>652</sup> While not quantified, these environmental  
 22 impacts must be considered as costs and consequences associated with advanced treatment.

23  
 24  
 25  
 26 <sup>649</sup> See section VI, *supra*.

27 <sup>650</sup> See section V, *supra*.

28 <sup>651</sup> Permit, pp. F-72 to F-80.

<sup>652</sup> Costs/Benefits Analysis, pp. X-XII.

1 **F. Conclusion**

2 The Regional Board strained to find a basis for the very costly Permit limitations through  
3 an unprecedented and nominal antidegradation analysis for an already-permitted discharge. The  
4 Regional Board's analysis did not comply with applicable regulations and State Board guidance,  
5 and the Regional Board's result-oriented and superficial findings and conclusions are inadequate  
6 and unsupported by evidence. The State Board should determine that the discussion and findings  
7 under the heading "Satisfaction of Antidegradation Policy" are improper.

8 **IX. OTHER MIXING ZONES WERE IMPROPERLY DENIED AND AN**  
9 **INAPPROPRIATE CHRONIC TOXICITY TRIGGER WAS ESTABLISHED**

10 In accordance with the SIP, Basin Plan, and TSD,<sup>653</sup> the District provided extensive  
11 documentation and evidence to support a proposed 60-foot long acute mixing zone, a 350-foot  
12 long chronic mixing zone,<sup>654</sup> and a harmonic mean flow human health mixing zone at the point  
13 where complete mixing of the SRWTP effluent and Sacramento River occurs, approximately  
14 three miles downstream from the discharge point.<sup>655</sup> However, despite the overwhelming and  
15 complete evidence submitted by the District, the Permit denies an acute mixing zone even though  
16 it meets the requirements of the SIP, and denies mixing zones and dilution credits for specific  
17 compounds such as ammonia, nitrate, chlorpyrifos and diazinon, copper, cyanide, and chronic  
18 toxicity. The improper denials of mixing zones for ammonia and nitrate are addressed in  
19 sections VI and VII, *supra*, and are not repeated here. The Regional Board's improper actions  
20 with respect to the other compounds are identified here. In addition, the District explains the  
21 related conclusion that the Permit established an inappropriate chronic toxicity trigger.

22 As a preliminary matter, the District acknowledges that the Regional Board has some  
23 discretion in granting mixing zones and dilution credits. However, that discretion is not  
24 unfettered and the Regional Board must explain its denials based on consideration of the facts of

25 <sup>653</sup> TSD.

26 <sup>654</sup> Technical Memorandum, "Mixing Zones and the Prevention of Acutely Toxic Conditions," to Bob Seyfried and  
27 Vyomini Pandya SRCSD (July 13, 2009).

28 <sup>655</sup> 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.

1 the discharge and evidence in the record.<sup>656</sup> Further, the State Board has specified the measure for  
 2 granting mixing zones:

3 While granting a mixing zone is discretionary, in reaching our conclusion we  
 4 consider that the Regional Board did not fully consider information in the record,  
 5 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.<sup>657</sup>

6 The District performed extensive water quality modeling to determine the extent of actual  
 7 dilution downstream of the diffuser for the SRWTP discharge. The modeling of the receiving  
 8 water and mixing zones has been peer reviewed and approved by the Regional Board for use in  
 9 permit development, including WQBEL calculation.<sup>658</sup>

10 The State Board also requires consideration of information in the record, the cost of  
 11 treatment without allowing the dilution credit, and evidence of harm associated with the mixing  
 12 zone. The District has supplied information demonstrating the proposed acute mixing zone is  
 13 protective of aquatic life, and that the proposed mixing zones for specific constituents are  
 14 appropriate and necessary.<sup>659</sup> While the District provided a complete analysis and presentation of  
 15 the projected costs for various levels of treatment, the costs of treatment associated with denial of  
 16 the mixing zones was not discussed or considered in the Permit as required.<sup>660</sup> Thus, the  
 17 information in the Permit fails to provide proper justification for not allowing an acute mixing  
 18 zone and for denying dilution credits for the other identified constituents.<sup>661</sup> Those denials are  
 19 inappropriate and the mixing zones should be allowed.

20  
 21  
 22  
 23 <sup>656</sup> State Board Order WQO 2004-0013, *supra*, p. 10.

24 <sup>657</sup> State Board Order WQO 2004-0013, *supra*, p. 12.

25 <sup>658</sup> See District's October 2010 Comments and Evidence Letter, pp. 81-84; see also Dynamic Model Acceptance  
 Letter.

26 <sup>659</sup> Technical Memorandum, "Mixing Zones and the Prevention of Acutely Toxic Conditions," to Bob Seyfried and  
 Vyomini Pandya SRCSD (July 13, 2009).

27 <sup>660</sup> See section IV, *supra*.

28 <sup>661</sup> Permit, pp. F-28 to F-44.

1 **A. The Denial of an Acute Aquatic Life Mixing Zone Is Not Justified**

2 The Permit finds that the District's proposed acute aquatic life mixing zone of 400 feet  
 3 wide by 60 feet downstream of the diffuser meets all of the requirements of the SIP.<sup>662</sup> To make  
 4 this finding, the Permit reviews the eleven SIP criteria and provides a brief explanation for each  
 5 one as to how and why the acute mixing zone complies. For example, the second SIP criterion  
 6 states that the acute aquatic life mixing zone shall not "cause acutely toxic conditions to aquatic  
 7 life passing through the mixing zone."<sup>663</sup> In response, the Permit finds that the minimum float  
 8 time for passing through the acute aquatic life mixing zone is 2.8 minutes, which is well below  
 9 U.S. EPA's recommended float time of 15 minutes.<sup>664</sup> The Permit also finds that compliance with  
 10 the acute toxicity effluent limit based on acute bioassays using 100% effluent will ensure that  
 11 acutely toxic conditions to aquatic life passing through the acute mixing zone do not occur.<sup>665</sup>

12 Yet, despite these Permit findings, an acute aquatic life mixing zone is denied in general  
 13 because of unexplained "concerns with aquatic toxicity in the Delta . . . ."<sup>666</sup> The Permit further  
 14 concludes that an acute aquatic life mixing zone is not allowed because the Delta is impaired for  
 15 unknown toxicity and has experienced significant declines in Delta fish populations, i.e., the  
 16 POD.<sup>667</sup> Such a statement contradicts the Permit finding that the mixing zone would not cause  
 17 acutely toxic conditions to aquatic life passing through the mixing zone. If the mixing zone is not  
 18 acutely toxic to passing organisms, it is difficult to ascertain how the granting of such a mixing  
 19 zone would further cause concerns with acute aquatic toxicity in the Delta downstream of the  
 20 mixing zone. Moreover, the Permit wholly fails to include any references or information that  
 21 identify or link the alleged aquatic toxicity downstream in the Delta to allowing an acute mixing  
 22 zone for aquatic life for the SRWTP discharge.

23 \_\_\_\_\_  
 24 <sup>662</sup> Permit, pp. F-34 to F-36.

25 <sup>663</sup> SIP, p. 17.

26 <sup>664</sup> Permit, p. F-34.

27 <sup>665</sup> Permit, pp. F-34 through F-35 (the Permit references the "chronic" mixing zone, however, this appears to be in  
 28 error as the discussion in question is specific to the acute mixing zone).

<sup>666</sup> Permit, p. F-36.

<sup>667</sup> Permit, p. F-36.

1 Generally, in accordance with the TSD, mixing zones are allocated for types of criteria or  
 2 objectives. If it can be demonstrated that the acute mixing zone is sufficiently sized to prevent  
 3 any acute toxicity to organisms passing through the zone, the acute mixing zone is considered  
 4 protective of the aquatic life beneficial use.<sup>668</sup> Thus, if the acute mixing zone is sufficiently sized  
 5 to comply with the SIP, Basin Plan, and U.S. EPA regulations and guidance for ensuring the  
 6 intended level of protection for the aquatic life beneficial use, the Regional Board should find the  
 7 mixing zone appropriate and approve it for use in derivation of effluent limits for the discharge.

8 As the Permit finds, the acute aquatic life mixing zone complies with the SIP.<sup>669</sup> To deny  
 9 the allowance of the acute mixing zone after making such a finding is completely at odds with  
 10 this finding and unreasonable. The Regional Board must explain its conclusion in the Permit.<sup>670</sup>  
 11 This has not occurred.

12 Furthermore, the proposed acute mixing zone for the District's discharge has been  
 13 established in a manner that is consistent with acute mixing zones granted by the Regional Board  
 14 in other NPDES permits. The denial of an acute mixing zone here, without proper cause, is  
 15 inconsistent with the Regional Board's practice of granting acute mixing zones to other  
 16 POTWs.<sup>671</sup>

17 **B. The Regional Board Improperly Denied the Use of a Dynamic Model For Copper**

18 The Permit finds that assimilative capacity for copper is available but does not include  
 19 final WQBELs based on assimilative capacity or dynamic modeling because dilution credits are  
 20 deemed not necessary.<sup>672</sup> Instead, the Permit includes end-of-pipe WQBELs for copper using a  
 21 steady state effluent limit derivation approach. The differences in the limits derived from the  
 22 dynamic model as compared to the steady state approach are as follows: 7.7 µg/L AMEL and

23  
 24 <sup>668</sup> SIP, p. 17.

25 <sup>669</sup> Permit, pp. F-34 to F-36.

26 <sup>670</sup> State Board Order No. WQ 95-4, *supra*, pp. 10, 21-22.

27 <sup>671</sup> 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.

28 <sup>672</sup> Permit, p. F-41.

1 9.8  $\mu\text{g/L}$  MDEL; and, 7.3  $\mu\text{g/L}$  AMEL and 9.3  $\mu\text{g/L}$  MDEL, respectively. Although differences  
 2 between the limits appear to be modest, failure to use the dynamic model results may put the  
 3 District in jeopardy for noncompliance. Specifically, due to concerns of concentrating  
 4 constituents via water conservation, the copper concentrations in the SRWTP effluent may  
 5 increase in the future and may exceed the steady state limits adopted into the Permit.<sup>673</sup> Thus, the  
 6 determination that the steady state limits are appropriate because the District can meet them  
 7 currently fails to consider near-term future conditions. The failure to use the approved dynamic  
 8 model to calculate effluent limits for copper is not justified by the findings in the Permit or  
 9 evidence in the record.

10 Regional Board staff accepted the District's dynamic modeling tool as being appropriate  
 11 for use in the NPDES permit renewal process, stating:

12 Based on the results of the extensive reviews and validation studies that have been  
 13 performed, Regional Water Board staff will proceed to use the District's modeling  
 14 tools for the NPDES permit renewal process. Specifically, the tools are judged to  
 15 be suitable for use in the dynamic near field modeling of the District's discharge  
 16 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.<sup>674</sup>

17 As the District's models were developed in a sound and scientifically defensible manner,  
 18 with extensive review by Regional Board staff and the Regional Board's independent modeling  
 19 experts,<sup>675</sup> the results of the models indicating concentrations and compliance with the magnitude,  
 20 duration, and frequency of the criteria and objectives are accurate and defensible. U.S. EPA  
 21 guidance states, "[d]ynamic models make best use of the specified magnitude, duration, and  
 22 frequency of water quality criteria and thereby provide a more accurate calculation of discharge  
 23 impacts on ambient water quality . . . . [I]f adequate receiving water flow and effluent  
 24 concentration data are available to estimate frequency distributions, EPA recommends that one of  
 25 the dynamic wasteload allocation modeling techniques be used to derive wasteload allocations

26 <sup>673</sup> District's October 2010 Comments and Evidence Letter, p. 87.

27 <sup>674</sup> Dynamic Model Acceptance Letter.

28 <sup>675</sup> See, e.g., Dynamic Model Acceptance Letter.

1 [i.e. effluent limits] which will more exactly maintain water quality standards.”<sup>676</sup> Where  
 2 available, a dynamic model is preferable to a steady state model, as the dynamic approach is a  
 3 more robust and accurate representation of the conditions in the receiving water.

4 Thus, effluent limits calculated using the dynamic models are more accurate and reflective  
 5 of ambient water quality in the vicinity of the discharge. If adequate data and dynamic modeling  
 6 tools and results are available, it is inappropriate to evaluate effluent limits using a steady state  
 7 approach *as was done here for copper*. The steady state and dynamic approaches are not  
 8 equivalent; the dynamic approach is acknowledged as being superior in all respects.

9 The effluent limits shown in Table F-11 of the Permit and calculated using the dynamic  
 10 model based on acute and chronic mixing zones are protective of beneficial uses, attainable based  
 11 on plant performance, and calculated using the most robust and accurate approach available.<sup>677</sup>  
 12 The Regional Board should have adopted these as the appropriate effluent limits for copper.

13 **C. The Regional Board Improperly Denied Acute Aquatic Life Dilution Credits**  
 14 **for Cyanide**

15 For cyanide, the Permit grants a dilution credit based on available chronic aquatic life  
 16 dilution.<sup>678</sup> Conversely, acute dilution is not allowed because the Permit finds that it is not  
 17 needed.<sup>679</sup> Although a dilution credit based on chronic aquatic life is allowed, the Permit does not  
 18 incorporate WQBELs calculated from the dynamic model but instead calculates a performance-  
 19 based limit. For example, using the dynamic model and granting only a chronic aquatic life  
 20 mixing zone, the WQBELs for cyanide would be 11 µg/L for the AMEL and 22 µg/L for the  
 21 MDEL. Without any discussion or rationale, the Regional Board finds that granting dilution  
 22 credits based on the dynamic models could allocate an unnecessarily large portion of the  
 23 receiving water’s assimilative capacity for cyanide and violate the antidegradation policy.<sup>680</sup>

24 <sup>676</sup> Memorandum from Martha G. Prothro to Water Management Division Directors, Regions I-X, re: Office of Water  
 25 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).

26 <sup>677</sup> Permit, p. F-41.

27 <sup>678</sup> Permit, p. F-41.

28 <sup>679</sup> Permit, p. F-41.

<sup>680</sup> Permit, p. F-66.

1 Based on this vague and unsubstantiated finding, the Permit instead includes a MDEL for cyanide  
2 of 11 µg/L.<sup>681</sup>

3 As discussed previously, the use of dynamic models is a superior approach as it provides  
4 for a more accurate and reasonable representation of the conditions in the receiving water.<sup>682</sup>  
5 Further, when calculating WQBELs, the first step is not to determine what is necessary for  
6 compliance, but rather to determine the appropriate WQBEL considering available dilution  
7 credits and facts of the specific discharge under consideration. When there are significant  
8 differences between the calculated WQBEL and plant performance, the Regional Board  
9 appropriately may reserve some portion of assimilative capacity. When exercising this discretion,  
10 the Regional Board must explain its actions in the findings.<sup>683</sup> Moreover, if the Regional Board's  
11 justification is because of potential violations to the antidegradation policy, then the Regional  
12 Board must explain this rationale.<sup>684</sup> This has not occurred.<sup>685</sup>

13 Further, the Permit indicates that for cyanide, discharges from the SRWTP use only 2.3%  
14 of the assimilative capacity of the Sacramento River.<sup>686</sup> Based on this information, it is difficult  
15 to understand how the Regional Board can legitimately find that the granting of the dilution  
16 credit, and derivation of effluent limits based on the dilution credit, would "allocate an  
17 unnecessarily large portion of the receiving water's assimilative capacity," and "violate the  
18 Antidegradation Policy."<sup>687</sup>

19 With respect to the adopted performance-based limit and the conclusion that no more is  
20 needed, the Regional Board failed to consider the significant modifications to the SRWTP that  
21 would occur based on other adopted Permit limits and the impact of water conservation and

22 <sup>681</sup> Permit, pp. F-13, F-66.

23 <sup>682</sup> See section IX.B, *supra*.

24 <sup>683</sup> 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.").

25 <sup>684</sup> State Board Order WQO 2004-0013, *supra*, p. 13.

26 <sup>685</sup> See Permit, p. F-66.

27 <sup>686</sup> See Permit, Table F-18, p. F-98.

28 <sup>687</sup> Permit, p. F-66; see section VIII, *supra*; see also District's October 2010 Comments and Evidence Letter,  
pp. 61-62.

1 growth on effluent levels of cyanide. Both of these are unknown factors, and it is uncertain how  
 2 such dramatic changes may impact effluent levels of cyanide and future compliance with effluent  
 3 limits.<sup>688</sup>

4 **D. The Regional Board Improperly Denied Dilution Credits for Chlorpyrifos and**  
 5 **Diazinon**

6 The Permit includes a combined effluent limit for chlorpyrifos and diazinon based on  
 7 waste load allocations (WLAs) contained in the Basin Plan.<sup>689</sup> The TSO finds that the SRWTP  
 8 cannot consistently comply with the effluent limits, and protects the District from mandatory  
 9 minimum penalties for a period of up to five years.<sup>690</sup> The Permit denies dilution credits,  
 10 claiming that because dischargers must meet the WLA, no dilution credits can be granted for  
 11 compliance with the water quality objectives for chlorpyrifos and diazinon.<sup>691</sup> The Permit also  
 12 states that, “[t]he WLA have been adopted in the Basin Plan as water quality objectives and  
 13 dilution are [sic] not allowed.”<sup>692</sup> The Regional Board’s denial of dilution credits here is  
 14 improper for various reasons. First, the WLA is not an adopted Basin Plan water quality  
 15 objective. The specific water quality objectives for chlorpyrifos and diazinon applicable to the  
 16 Delta are contained in Table III-2A of the Basin Plan.<sup>693</sup> They are specific numeric values that  
 17 include maximum concentrations for 1-hour (acute) and 4-day (chronic) averaging periods.<sup>694</sup> In  
 18 contrast, the WLA is included in the Implementation Plan and states as follows: “The waste load  
 19 allocations (WLA) for all NPDES-permitted dischargers, load allocations (LA) for nonpoint  
 20 source discharges, and the loading capacity of each of the Sacramento-San Joaquin Delta  
 21  
 22

23 <sup>688</sup> District’s October 2010 Comments and Evidence Letter, pp. 87, 98.

24 <sup>689</sup> Permit, pp. F-68 to F-69; see Basin Plan, pp. III-6.01, IV-26.00 to IV-26.01.

25 <sup>690</sup> TSO, pp. 3, 5.

26 <sup>691</sup> Permit, p. F-68.

27 <sup>692</sup> Permit, p. F-42.

28 <sup>693</sup> Basin Plan, p. III-6.01.

<sup>694</sup> Basin Plan, p. III-6.01.

1 Waterways . . . shall not exceed the sum (S) of one (1) as defined below. [equation in the  
2 original].”<sup>695</sup>

3 In addition, when adopting effluent limits to protect numeric water quality criteria (the  
4 water quality objectives for chlorpyrifos), the effluent limitations need to be “*consistent with the*  
5 *assumptions and requirements of any available [WLA] for the discharge.*”<sup>696</sup> The effluent  
6 limitation need not mirror or exactly replicate the WLA. In this case, the Basin Plan does not  
7 specifically state that mixing zones shall be denied and dilution credits not considered when  
8 implementing the collective WLA for chlorpyrifos and diazinon. Further, determinations of  
9 impairment alone (the basis for adoption of a WLA) are not sufficient for denial of a dilution  
10 credit. The State Board has stated as follows: “In Order No. WQO 2001-06 (Tosco), we  
11 addressed this same issue. There, we stated that ‘the listing itself is only suggestive; it is not  
12 determinative.’ We stated that in developing effluent limitations, regional boards must review  
13 available ambient data and base their determinations on those data.”<sup>697</sup> By extension, denial of  
14 assimilative capacity based on the existence of the WLA. Merely because a WLA is an adopted  
15 part of the Basin Plan does not mean there is no assimilative capacity for the constituent of  
16 concern. In this case, there is assimilative capacity available and a dilution credit should be  
17 granted in the determination of effluent limits for chlorpyrifos and diazinon.

18 At the very least, the Regional Board has an affirmative duty to explain its rationale for  
19 denying dilution in the Permit and why an effluent limit that is designed to be consistent with the  
20 WLA automatically means that dilution credits must be denied.<sup>698</sup> The Permit does not contain  
21 any such rationale or explanation.

22 **E. The Regional Board Improperly Denied a Chronic Toxicity Trigger of 13.3 TUc**

23 The State Board should determine that the appropriate toxicity trigger for whole effluent  
24 toxicity (WET) is 13.3 TUc.

25 \_\_\_\_\_  
<sup>695</sup> Basin Plan, p. IV-36.03.01.

26 <sup>696</sup> 40 C.F.R. § 122.44(d)(1)(vii)(B), emphasis added.

27 <sup>697</sup> State Board Order WQO 2004-0013, *supra*, p. 14.

28 <sup>698</sup> See State Board Order No. WQ 95-4, *supra*, pp. 10, 21-22.

1 The Permit includes provisions for chronic WET that are designed to ensure compliance  
 2 with the Basin Plan's narrative toxicity objective.<sup>699</sup> Included in the chronic WET provisions is a  
 3 numeric toxicity monitoring trigger of 8 TUc (where  $TUc=100/NOEc$ ).<sup>700</sup> If chronic toxicity in  
 4 the effluent exceeds the trigger level of 8 TUc, the District must begin accelerated monitoring and  
 5 initiate a toxicity reduction evaluation.<sup>701</sup> Based on the District's dynamic modeling results, the  
 6 appropriate chronic toxicity trigger at the edge of the chronic mixing zone is 13.3 TUc, a fact  
 7 which is explicitly acknowledged in the Permit Fact Sheet.<sup>702</sup> However, for no valid reason, the  
 8 Permit includes a toxicity trigger set at 8.0 TUc. At most, the Permit states that the trigger is set  
 9 to 8.0 TUc because that is what was in the previous permit and the District has shown consistent  
 10 compliance with this trigger.<sup>703</sup> The Permit fails to provide any rationale or reasonable  
 11 explanation as to why the dynamic modeling results should be ignored. Like with the application  
 12 of mixing zones to specific constituents, the Regional Board must explain its denial of dilution  
 13 credits here (i.e., difference between 8.0 TUc and 13.3 TUc) based on the facts of the  
 14 discharge.<sup>704</sup> This has not occurred.

15 Further, the Permit includes a study requirement to determine if it is feasible to use  
 16 *Hyallolella azteca* for both acute and chronic toxicity.<sup>705</sup> Assuming *arguendo* that it is feasible to  
 17 use *Hyallolella azteca* for chronic WET testing, it is possible that the chronic trigger of 8.0 TUc will  
 18 not be sufficient and the District may not comply with a chronic toxicity trigger of 8.0 TUc.<sup>706</sup>  
 19 Failure to meet the chronic toxicity trigger results in the need to conduct accelerated monitoring  
 20 and initiate a toxicity reduction evaluation (TRE), which are costly endeavors. Such costs are  
 21 improper, especially considering that additional available chronic dilution for chronic toxicity

22 \_\_\_\_\_  
 23 <sup>699</sup> Permit, pp. 26-28.

24 <sup>700</sup> Permit, p. 27.

25 <sup>701</sup> Permit, p. 27.

26 <sup>702</sup> Permit, p. F-112.

27 <sup>703</sup> Permit, p. F-112.

28 <sup>704</sup> State Board Order WQO 2004-0013, *supra*, p. 10.

<sup>705</sup> Permit, pp. 28-29.

<sup>706</sup> See Permit, p. F-111.

1 exists. Thus, denial by the Regional Board was improper because it did not fully consider all  
2 information in the record.<sup>707</sup>

3 **X. THE PERMIT MONITORING REQUIREMENT FOR NDMA VIOLATES**  
4 **FEDERAL REGULATIONS AND THE SIP**

5 The State Board should determine that the Permit requires an improper method for  
6 monitoring of NDMA. In section IV.A.1.a (Table 6), the Permit establishes, for the first time,  
7 effluent limitations for NDMA for the SRWTP.<sup>708</sup> The Monitoring and Reporting Program  
8 (MRP) of the Permit requires the District to conduct effluent monitoring for NDMA using  
9 U.S. EPA Method 521.<sup>709</sup> U.S. EPA Method 521 provides procedures for “the determination of  
10 nitrosamines in finished drinking water.”<sup>710</sup> The method has not been evaluated for untreated  
11 source waters and other types of water supplies.<sup>711</sup>

12 More importantly, requiring effluent testing for NDMA using U.S. EPA Method 521  
13 violates federal regulations and the SIP without the District’s consent. When requiring  
14 monitoring to determine compliance with permit effluent limits, monitoring must be required,  
15 “[a]ccording to test procedures approved under 40 C.F.R. Part 136 for the analyses of pollutants  
16 or another method is required under 40 C.F.R. subchapters N or O.”<sup>712</sup> When there are no  
17 approved methods under 40 C.F.R. Part 136, monitoring must be conducted according to a test  
18 procedure specified in the Permit.<sup>713</sup> For NDMA, 40 C.F.R. Part 136 identifies multiple approved  
19 methods— U.S. EPA Method 521 is not one of them.<sup>714</sup> The SIP allows for alternative test  
20 methods in specified circumstances, including: “[w]hen the discharger and the RWQCB agree to

21 \_\_\_\_\_  
22 <sup>707</sup> State Board Order WQO 2004-0013, *supra*, p. 12.

23 <sup>708</sup> Permit, p. 14.

24 <sup>709</sup> Permit, p. E-6.

25 <sup>710</sup> Method 521, Determination of Nitrosamines in Drinking Water by Solid Phase Extraction and Capillary Column  
26 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.)

27 <sup>711</sup> U.S. EPA Method 521, p. 521-2.

28 <sup>712</sup> 40 C.F.R. § 122.44(i)(1)(iv).

<sup>713</sup> 40 C.F.R. § 122.44(i)(1)(iv).

<sup>714</sup> 40 C.F.R. § 136.3, Table IC.

1 include in the permit a test method that is more sensitive than those specified in 40 CFR 136  
2 (revised as of July 3, 1999).”

3 Compliance with the procedures identified in 40 C.F.R. Part 136 is approved pursuant to  
4 the federal regulations, or required when submitting reports under an NPDES Permit unless an  
5 alternate test procedure is agreed to by the discharger and the Regional Board.<sup>715</sup> The District has  
6 not agreed at this time to include U.S. EPA Method 521 as an alternative to those methods  
7 approved in Part 136 for NDMA.<sup>716</sup> Further, there is no evidence to suggest that U.S. EPA  
8 Method 521 has been approved pursuant to the federal regulations. Accordingly, requiring the  
9 use of U.S. EPA Method 521 to monitor effluent for NDMA without the District’s consent  
10 violates the SIP and federal regulations and must be removed. Regional Board staff commented  
11 that the District has previously used U.S. EPA Method 521 for NDMA.<sup>717</sup> However, previous  
12 District monitoring using U.S. EPA Method 521 is irrelevant because it was not required by the  
13 previous permit and was not conducted to ensure compliance with effluent limitations. Thus,  
14 previous monitoring was not required to comply with the regulations in the SIP or 40 C.F.R.  
15 Part 136. The MRP is inconsistent with those regulations.

16 ///

17 ///

18 ///

19 ///

20 ///

21 ///

22 ///

23 ///

24 ///

25 ///

26 <sup>715</sup> 40 C.F.R. §§ 136.4-136.5.

27 <sup>716</sup> District’s October 2010 Comments and Evidence Letter, p. 106.

28 <sup>717</sup> Staff Response to Comments, p. 67.

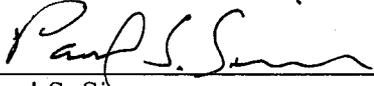
SOMACH SIMMONS & DUNN  
A Professional Corporation

**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:   
Paul S. Simmons  
Attorneys for Petitioner  
SACRAMENTO REGIONAL COUNTY  
SANITATION DISTRICT

OFFICE OF THE COUNTY COUNSEL

DATED: January 10, 2011

By:   
Lisa A. Travis  
Attorneys for Petitioner  
SACRAMENTO REGIONAL COUNTY  
SANITATION DISTRICT

SOMACH SIMMONS & DUNN  
A Professional Corporation

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28

**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 Polissr 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

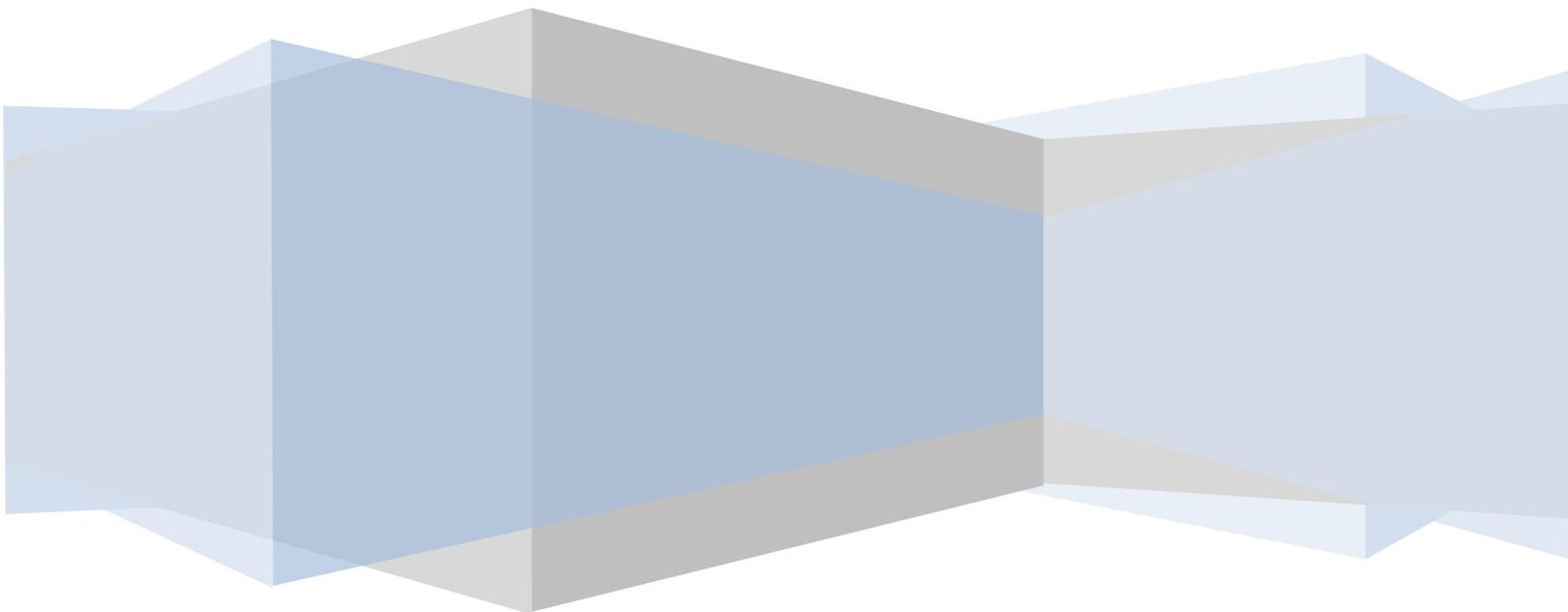
I declare under penalty of perjury that the foregoing is true and correct. Executed on January 10, 2011, at Sacramento, California.

  
\_\_\_\_\_  
Crystal Rivera

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28

# **A Review of Delta Fish Population Losses from Pumping Operations in the Sacramento-San Joaquin River Delta**

*Prepared by Larry Walker Associates  
January 2010*



## REPORT OVERVIEW

### **An Examination of Causes and Mitigation of Delta Fish Loss From Pumping Operations**

The issues facing the Sacramento-San Joaquin Delta are serious and complex. Although the challenge of how to restore the Delta ecosystem and its fish populations while improving water supply reliability has taken center stage recently, it is not a new issue. For more than 30 years researchers have documented the significant direct impacts the south Delta water project operations have on Delta fish and their habitat. At the same time, the amount of water pumped from the Delta through the Central Valley Project (CVP) and the State Water Project (SWP) doubled from 1991 to 2005 as illustrated in the December 2009 report by the Public Policy Institute of California called “California Water Myths.”

The recent collapse of Delta fish populations creates the need for immediate and renewed action to reduce fish losses in and around the water project facilities. Many questions remain and more research is necessary to fully examine the numerous issues facing the Delta. However, there is a significant amount of data – which this paper summarizes – that should not be overlooked.

### **Significant Fish Losses Documented at Delta Water Pump Operations For More Than 30 years**

From 1976 to 2009, numerous research studies by credible Delta experts have

determined that despite the creation of fish “protection” facilities, the vast majority of juvenile Chinook Salmon (63% to 99%) and delta smelt (up to 99%) that are “entrained” near major water project facilities in the South Delta do not survive.

The Clifton Court Forebay (CCF) is a regulating reservoir located between the Delta and the SWP intake. CCF helps water project operators control water level and water velocity at the screens. CCF also has become a convenient feeding ground for a large number of predators that include fish and birds. A recent 2009 study of delta smelt found that as many as 94% to 99% of the smelt introduced into the CCF were eaten by predators. These are referred to as “pre-screen” losses.

The SWP and the CVP have fish protection facilities that try to collect the fish before they reach the Delta pumps. Fish louvers are placed in front of the pumps to prevent fish from entering the pumps, but are not completely effective. A 1996 report by the California Department of Water Resources (DWR) and the California Department of Fish and Game (DFG) cited studies performed by the departments in 1970-71 that determined the screens may allow as many as 30% of fish which enter the fish protection facilities to reach the pumps.

Fish are collected in the fish protection facilities so they can be “salvaged.” From the collection area they are placed in holding tanks, then loaded into tank trucks, driven to specific locations in the Delta, and discharged from the trucks through pipes that extend out into Delta waters.

In a 2009 Biological Opinion, National Marine Fisheries Service (NMFS) reports there is typically debris in the holding tanks

along with the fish, which can disorient, injure and kill fish due to turbulent forces in the pipeline when the fish are released.

NMFS anticipates that 10% to 30% of salvaged fish are lost to predators at the Delta release sites and that an additional number die after release due to stress or injury associated with the handling process.

A 1996 report by DWR and DFG concluded that for every salmon salvaged at the fish protection facilities, more than three are lost to predators or are lost through the fish screens. The report stated that these loss rates “demonstrate a serious problem.”

The same 1996 report stated that over a 15-year period (1979 to 1993), 110 million fish were reported to have been salvaged at Skinner Fish Facility, the fish protection

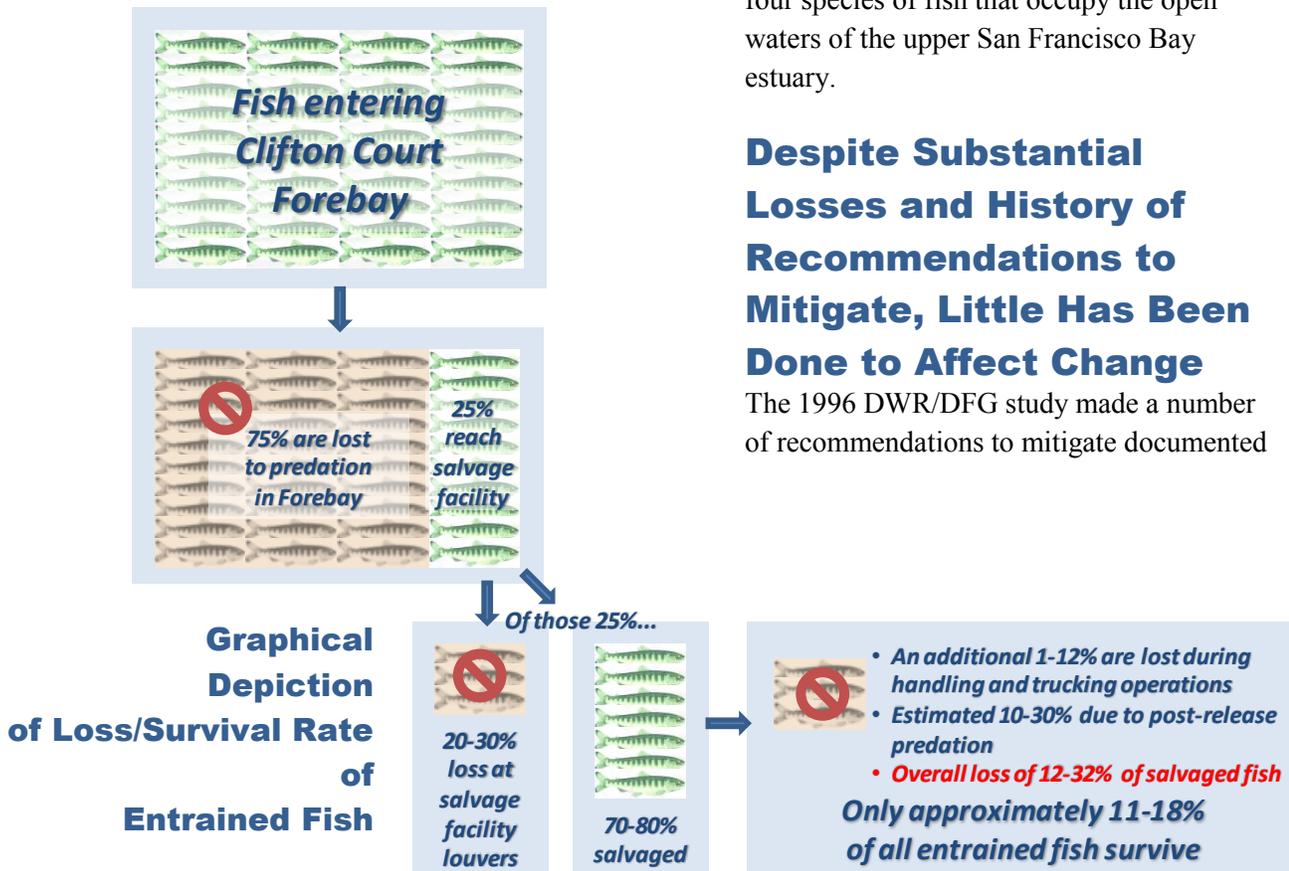
facility at the SWP. These salvage statistics greatly understate the total number of fish entrained, since they do not include the number of fish lost to predators or lost through the fish screens. In fact, recent estimates indicate that 5-10 times more fish are lost than are salvaged, largely due to the high predation losses in and around water project facilities.

In 2008, Wim Kimmerer, a prominent ecologist and Delta researcher, estimated that approximately 30 times more delta smelt are entrained than are salvaged.

In 2008, United State Fish and Wildlife Service (USFWS) also reported that high entrainment rates during winter months are suspected as a contributing cause of the early 1980s delta smelt decline and the pelagic organism decline or “POD.” The POD refers to the record low numbers of four species of fish that occupy the open waters of the upper San Francisco Bay estuary.

### Despite Substantial Losses and History of Recommendations to Mitigate, Little Has Been Done to Affect Change

The 1996 DWR/DFG study made a number of recommendations to mitigate documented



fish losses such as replacing existing fish screens, reducing the number of salmon entering the CCF and encountering the screens, and moving the intake for the California aqueduct. Little or no action was taken to implement these suggestions.

In 2000 the CALFED Record of Decision highlighted the need to improve the fish screens at the South Delta pumps. Although these improvements were to be in operation by 2006, they remain on hold.

Now underway is the Bay Delta Conservation Plan (BDCP), an effort intended to allow the water exporters to obtain another incidental take permit for fish losses associated with their operations. While the BDCP is proposed to serve co-equal goals of water supply and ecosystem restoration, operational improvement recommendations to date include a less than comprehensive predator control program and plans to study non-structural barriers to prevent fish from entering the CCF and other areas of the Delta. No measures to improve the south Delta fish screens or salvage facilities have emerged.

The fish protection facilities at the South Delta pumps, including the fish screens and salvage facilities, remain largely unchanged since they were first engineered over 40 years ago.

### **Full Impact of Pumping Operations Still Must Be Determined**

In 2008, Wim Kimmerer published a paper that demonstrated that fish mortality associated with project operations can be causing adverse impacts on the populations of these species.

Prior to that work, most efforts have sought to assess the effects of project operations or export volumes through correlation analyses. Such analyses have limitations and are greatly affected by the study period selected and other assumptions.

There is a lack of data to fully quantify the impact that the ongoing fish mortality in and around the south Delta pumps is having on total fish populations.

Also absent is a strong analysis of “indirect” fish losses associated with hydrodynamic and habitat changes brought by south Delta pumping operations.

### **A Call to Action**

For 30 years scientists and regulatory agencies have documented the significant impacts the water export operations have on Delta fish – and yet little action has been taken to correct the situation. When the POD signaled the Delta ecosystem is in real trouble a few years ago, the response was to shift the blame from the known impacts of the water exports to potential other “stressors.”

Certainly, more research must be done to fully understand all of the issues that may be affecting the health of the Delta and what action should be taken to address them, but the comprehensive and integrative research needed to yield sound data on these issues will take years. In the meantime, immediate action should be taken to mitigate the known and well documented impacts of the water exports on the Delta ecosystem and endangered fish species. Too much is at stake to allow further delay in addressing the ongoing fish mortality associated with the water project operations, especially when the evidence paints such a clear picture. ■

## INTRODUCTION

### Overview of the Delta

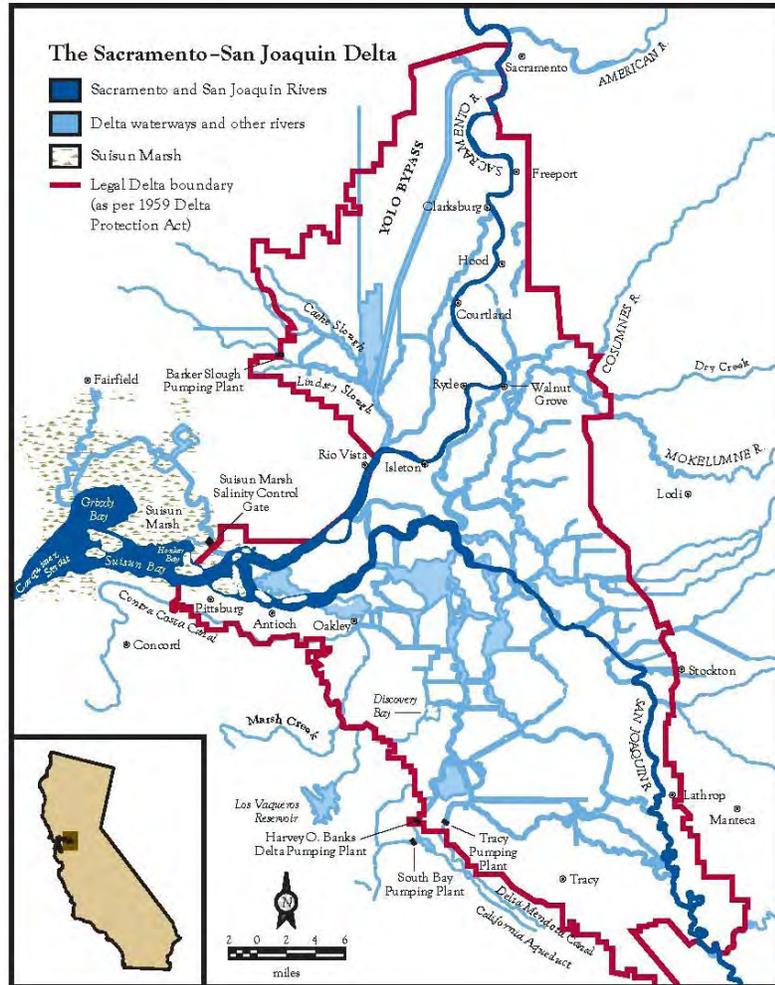
The Sacramento-San Joaquin River Delta is an inland river delta and estuary in northern California at the western edge of the Central Valley near the confluence of the Sacramento and San Joaquin rivers. It lies east of where the rivers enter Suisun Bay (an upper arm of San Francisco Bay).

Water flows from the Sacramento and San Joaquin Valleys to the Delta where it enters a maze of sloughs and waterways leading to the San Francisco Bay. The flow of water in the Delta is directed by an extensive system of levees. The flow patterns through the Delta are largely determined by:

- Tidal influences that move salt water in and out of the Delta daily;
- Flows from major rivers that vary considerably throughout the year;
- Operation of flow control structures on certain waterways in the Delta; and
- Export of water from the Delta for urban and agricultural use.

### Delta as Water Distribution System

The Delta serves as a major water distribution system for many parts of the State, and also many agricultural and



Map Source: PPIC Report - *Envisioning the Sacramento-San Joaquin Delta*.

municipal water diverters surrounding and within the Delta itself. The two largest water export systems are the Central Valley Project (CVP) and the State Water Project (SWP). Both systems take water from the southern part of the Delta and send it to other parts of the state, primarily the south.

The CVP is operated by the U.S. Bureau of Reclamation (USBR). It includes reservoirs upstream of the Delta, in-Delta facilities, and conveyance facilities that head towards the southern part of the state (for example, the Delta Mendota Canal). Within the south Delta, the CVP includes the Tracy Fish Collection Facility that helps to prevent fish

from being pumped out of the Delta by the Jones Pumping Plant (formerly known as the Tracy Pumping Plant).

The SWP is operated by the California Department of Water Resources (DWR). It includes reservoirs upstream of the Delta, in-Delta facilities, and conveyance facilities that head towards the southern part of the state (i.e. the California Aqueduct). Within the south Delta, the SWP includes the intake



**Aqueduct of the State Water Project**

point known as Clifton Court Forebay, the Skinner Fish Protective Facility (a system designed to screen out fish from water pumped by the SWP so they can be transported back to the Delta), and the Banks Pumping Plant.

## **Fish Population Problems in the Delta**

The Delta is home to approximately 22 species of fish including the **delta smelt**, a key indicator species for the health of the Delta's ecosystem. In 2004 the delta smelt was found to be on the edge of extinction. Other fish experiencing serious population

declines include longfin smelt, salmon, steelhead and green sturgeon.

Numerous hypotheses related to water quality conditions and other stressors have been put forth as



**Delta smelt**

the cause or causes of the recent precipitous decline in threatened Delta fish populations. Few of these hypotheses focus on areas where a definitive link exists to fish mortality or impacts on fish populations. However, fish losses due to State Water Project and Central Valley Water Project pumping operations in the south Delta are well-documented, and have potential population level effects.

This document provides an overview of key reports that have documented fish losses due to pumping operations, and a chronology of efforts to identify and implement mitigation measures to prevent fish loss. The information indicates that while substantial fish losses have been documented since the late 1970s, comprehensive mitigation actions directed to reduce these losses have not occurred.

---

*This document provides an overview of key reports that have documented fish losses due to pumping operations, and a chronology of efforts to identify and implement mitigation measures*

## Key Definitions

**Entrainment:** When fish are pulled into the vicinity and “trapped” in water project facilities. Entrainment occurs extensively in the Clifton Court Forebay when fish enter the forebay and cannot swim out.

**Pre-Screen Loss:** Losses of fish due to export operations that occur before they can be collected and salvaged at the fish protection facilities. Pre-screen losses can be particularly extensive in the Clifton Court Forebay due to predation from other fish and birds.

**Salvage:** Collection of fish upstream of pumping facilities with the intent of returning them safely to the Delta. The CVP’s Tracy Fish Collection Facility and the SWP’s Skinner Fish Protective Facility both use a series of louvers to direct fish away from the flow to the pumps and into holding tanks. From the holding tanks they are transported and released back into the Delta.

**Additional losses:** Some fish are not successfully diverted by the fish collection facilities and are pumped into the canals that head towards the south part of the State and are removed from the Delta population. Additional losses occur as a result of trauma during the salvage process. Fish are also killed by predators which congregate at locations where salvaged fish are released.

**Total Fish Loss:** Total of all fish losses associated with all components of water project operations. Includes pre-screen loss, loss during and after salvage, and loss at the pumps.

## Fish Salvage Operations

To reduce fish loss at the pumps, the state and federal water export facilities operate facilities which are designed to salvage fish from the water and return them to the Delta. Fish facilities include the SWP **Skinner Fish Protection Facility** and CVP **Tracy Fish Collection Facility**. The fish facilities utilize two sets of louvers to prevent fish from entering further into water project operations and ultimately the powerful pumps. The louvers concentrate fish so that they can be removed prior to the water diversions. However, these fish salvage operations are inefficient, as high numbers of fish are lost due to predation in the waterways leading to the fish facilities, and the louvers are inefficient (Gingras, 1997 and Bowen et al., 2004).

Fish caught at these facilities are placed in holding tanks, loaded into tank trucks, and pumped out of the trucks through pipes at two release sites each for the SWP and CVP. These are called “Collection, Handling, Trucking and Release Operations.”



The CVP’s Tracy Fish Collection Facility



The SWP's Skinner Fish Protection Facility

**Clifton Court Forebay (CCF)** is a man-made regulating reservoir located in the Delta immediately upstream of the SWP intake. Inflow of water and entrained fish to CCF is controlled by three gates, which are opened at higher tide elevations to fill the reservoir. The forebay allows water project operators to control water depth and velocity at the fish facility and pumps. The forebay contains high numbers of predators (fish and birds), which contribute to “pre-screen” mortality.



Aerial view of Clifton Court Forebay

## Reports examining fish losses related to CVP and SWP pumping operations

Fish losses related to water project pumping operations have been documented in studies as far back as the 1970s. The following sections describe some of these key reports and studies that summarize fish losses.

### 1996 – DWR and DFG: Effectiveness of Fish Salvage Operations

A 1996 review by the Department of Water Resources and Department of Fish and Game (DFG) evaluated the effectiveness of fish salvage operations at the intake to the California Aqueduct between 1979 and 1993 (Brown et al., 1996). The authors evaluated fish salvage operations at the Skinner Fish Protection Facility, focusing on the fate of Chinook salmon throughout the salvage operations. **Based on an evaluation of previous studies examining pre-screen losses in Clifton Court Forebay, the review concluded that predation was responsible for a 75% pre-screen loss for Chinook salmon.** The 75% estimate was an average of the 1978, 1984, and 1985 pre-screen loss estimates, and was adopted in 1986 as part of a DFG and DWR mitigation agreement to offset direct losses of fish at the export facility.

The authors noted that additional fish are lost at the Skinner Fish Facility, as the louvers are not completely effective at blocking fish from entering the pumps. They cited a study by DFG and DWR from 1970-1971, which found that efficiency of the primary louvers ranged from 70-85%, and

*Based on an evaluation of previous studies examining pre-screen losses in Clifton Court Forebay, a 1996 DWR and DFG study concluded that predation was responsible for a 75% pre-screen loss for Chinook salmon.*

that efficiency of the secondary louvers ranged from 70-95%, and were more efficient for larger fish. The authors also noted that predation within the louvers could additionally cause an unknown portion of losses at the facilities.

The report concluded that **for every salmon salvaged, more than three were lost to predators in the forebay or through the fish screens, and that these statistics “demonstrate a serious problem.”** Due to the magnitude of the problem, a number of efforts were suggested to mitigate fish losses. Efforts suggested were: replacing existing screens, reducing the number of salmon entering the forebay and encountering the screens, and moving the intake for the California aqueduct.

**2008 – USFWS: Biological Opinion**

In the 2008 biological opinion for delta

smelt, United States Fish and Wildlife Service (USFWS) noted that fish entrainment at the Banks and Jones pumping plants is among the best-studied sources of fish mortality in the San Francisco estuary, due to the large volumes of water that are drawn from the estuary. All fish species inhabiting the Delta have been shown to be entrained in the export facilities.

Entrainment is of particular concern during dry years, when distributions of vulnerable fish populations shift upstream, closer to the export facilities. **The biological opinion pointed out the magnitude of entrainment at the export facilities, citing statistics that approximately 110 million fish were salvaged at the Skinner Fish Facility over a 15-year period.** The authors state that salvage statistics greatly underestimate the number of fish entrained, as they do not include losses through the louvers, nor do



they account for high rates of predation in Clifton Court Forebay. To emphasize the severity of the problem, **USFWS states that high entrainment during winter months was suspected as a contributing cause to the early 1980s delta smelt decline**, as well as the Pelagic Organism Decline (the detection of record low numbers of four fish species that occupy the open waters of the San Francisco Bay Estuary).

### **2009 -- NMFS: Biological Opinion**

The 2009 Biological Opinion for Salmonids reported high pre-screen losses in Clifton Court Forebay. Two studies that estimated losses due to predation in the forebay found:

- Pre-screen loss ranging from 63-99% for juvenile Chinook salmon and 70-94% for juvenile striped bass (Gingras, 1997).
- Pre-screen loss of steelhead ranging from 78-82% (DWR, 2008).

**These studies indicate that mortality is very high in the forebay for Endangered Species Act-listed salmonids, with 75-80% lost due to predation.** The biological opinion stated that, based on the increased frequency of greater pumping rates anticipated for the SWP, NMFS anticipates that substantial numbers of additional Chinook salmon and steelhead will be lost due to predation in the forebay. If pumping increases, additional salmonids will be drawn into the forebay, particularly during the months when those species are most present in the system and therefore vulnerable to predation. NMFS drew the conclusion that: “The proposed near term and future operations of the SWP, through the operations of the Clifton Court Forebay, will exert additional adverse effects upon the listed salmonid populations. The loss of these additional individual fish will further reduce the populations of listed salmonids.”

### ***The Plight of “Salvaged” Fish***

*Fish are impacted during the salvage operation due to trauma inflicted during the handling, trucking, and release operations when fish are transported from the collection facility to the release location in the Delta.*

*Typically, there is debris present in holding tanks along with the fish, which can injure and kill fish during transport. The biological opinion describes additional trauma to fish due to turbulent forces that occur when fish are pumped through the pipe which releases them into the river, and can injure and disorient fish; potential stranding of fish in the tanker truck if debris clogs the exit-way when water is emptied; vulnerability to predation when disoriented fish are released since predators are attracted to those release locations; delayed mortality from injuries; and shock from water quality conditions changing too quickly during the release procedure.*

*The biological opinion estimated that an additional 2% of fish die within 48 hours of release due to non-predation related stress. Release predation rates have not been quantified, but most likely add an additional 10 to 30% mortality.*

**- NMFS 2009 Biological Opinion**

### **2009 – DWR: Quantification of Pre-Screen Loss of Juvenile Steelhead in Clifton Court Forebay**

To follow up on a 2004 NMFS biological opinion, DWR conducted a series of studies to assess and quantify pre-screen losses of steelhead in Clifton Court Forebay, which was summarized in a 2009 report (DWR, 2009). The researchers completed smaller-scale studies in 2005 and 2006, and conducted a full-scale study in 2007. They tagged steelhead, released them at the entrance gates, and determined their fate by following the location of the tags. Pre-screen losses within Clifton Court Forebay ranged from 78-82%. Researchers focused on predation both by striped bass and by bird species, finding evidence that both predator types are foraging near the entrance gates.

The report recommended creating and implementing a management plan to reduce pre-screen losses within Clifton Court Forebay. It suggests revisiting predator reduction strategies which were studied during the 1990's, as well as conducting feasibility studies to determine if changes to the configuration of the forebay could reduce entrainment.

This report mentions that high losses in Clifton Court Forebay have been known about since the early 1980's. It refers to statistics on pre-screen losses from DFG studies conducted between 1976 and 1993, which show the range of pre-screen losses of juvenile Chinook salmon to be 63-99%.

### **2009 – USFWS: Ongoing Research on Delta Smelt Pre-Screen Loss and Salvage Efficiency**

Ongoing research by Castillo with the USFWS has focused on estimating pre-screen loss and salvage efficiency for delta

smelt (Castillo, 2009). Research conducted from February through June 2009 used marked delta smelt to evaluate salvage facility efficiency at Skinner Fish Protection Facility and pre-screen loss in Clifton Court Forebay. Results were presented in a poster at the 2009 State of the San Francisco Estuary Conference, where the study was noted as the “first experimental evaluation of the relation between delta smelt salvage at the Skinner Fish Protection Facility and underlying entrainment losses at the SWP in the south Delta.”

Study results suggested that entrainment losses of delta smelt could be much higher compared to other species previously studied at the SWP, and that pre-screen losses were very high for delta smelt. The percent recovery of delta smelt released at the entry point of Clifton Court Forebay and then recaptured at Skinner Fish Facility was low: 2.98% in February, 0.42% in March, and 0.03% in June. **The vast majority of delta smelt mortality could be attributed to pre-screen losses, which were 94.2% in February, 99.0% in March, and 99.9% in June.**

### **Summary of Data Related to Pre-Screen Losses**

The following table summarizes pre-screen loss data dating back to 1976. A report by Gingras (1997) summarized pre-screen loss data from mark-capture experiments in Clifton Court Forebay by DFG. More recent data were presented by Castillo (2009) in the presentation described in the previous section. Pre-screen loss percentages range from 63% to 99% for juvenile Chinook salmon, and from 94% to 99.9% for delta smelt.

## Summary of Data related to Pre-Screen Losses

Year	Species	Pre-screen loss %	Study/Reference
1976	Juvenile Chinook salmon	97	Gingras, 1997
1978	Juvenile Chinook salmon	88	Gingras, 1997
1984	Juvenile Chinook salmon	63	Gingras, 1997
1985	Juvenile Chinook salmon	75	Gingras, 1997
1986	Striped bass	70	Gingras, 1997
1992	Juvenile Chinook salmon	99	Gingras, 1997
1993	Juvenile Chinook salmon	99	Gingras, 1997
2007	Juvenile steelhead	78-82	Clark et al., 2009
2009 - February	delta smelt	94.2	Castillo, 2009
2009 – March	delta smelt	99.0	Castillo, 2009
2009 – June	delta smelt	99.9	Castillo, 2009

### Linkage of fish loss findings to population level impacts

The absence of prior work to address the linkage between the ongoing fish mortality in and around the south Delta pumps and population level effects is striking.

An article prepared by Kimmerer (2008) for San Francisco Estuary & Watershed Science provides valuable analysis of the effect of the direct loss of salmon and delta smelt associated with fish screens and pumping operations on the populations of those species. Losses of fish to mortality associated with export pumping have been blamed in part for declines of numerous species including striped bass (Stevens et al. 1985), Chinook salmon (Kjelson and Brandes 1989), and delta smelt (Bennett 2005).

Prior reviews relied on correlation analysis to attempt to link the pumping operations to fish population declines. Yet despite strong correlation, no quantitative estimates have been made to determine the impact of fish losses at the water export facilities on the

entire population of fish species. Moreover, there have been no published reports to measure the export losses against subsequent population size. As Kimmerer, a prominent ecologist and Delta researcher points out, this assessment “requires an analysis of mechanisms rather than one based on correlative relationships alone.” Using a mechanistic rather than correlative approach, Kimmerer found the following:

- Based on management targets for the Delta, salmon losses are higher than expected. Levels of mortality at the export facilities may place constraints on the recovery rate of the listed winter- and spring-run stocks of salmon.



Chinook salmon, *Onchorhynchus tshawytscha*.  
Reclamation photo by Rene Reyes.

- For adult delta smelt, Kimmerer estimated that approximately 30 times more delta smelt are entrained than are salvaged, with an overall pre-salvage loss rate of 97%. The estimates for cumulative loss of delta smelt over one season ranged from 3% to 50% for years 2002-2006. When looking at data back to 1995, mean proportional losses ranged from 0 to 23%.
- The proportional loss rates for larval and juvenile delta smelt peaked in early April from 1997 to 2005. The proportional losses were related to export flow, with the lowest proportional losses (approximately 25%) occurring during the dry years 2001-2003, and with a proportional loss of 62% occurring when export flow was at a maximum.
- Manipulating export flow (and, to some extent, inflow) is the only means to influence the abundance of delta smelt that is both feasible and supported by the current body of evidence.
- Losses of fish due to altered hydrodynamic conditions or migration cues in the Delta are called “indirect” losses. Although export pumping has substantial impacts on flow patterns in the Delta, the extent to which such alterations affect survival of fish is much less clear. Indirect losses may be important (NMFS, 2004), but they remain hypothetical and unquantified.

Kimmerer speculated as to the population level consequences of these proportional losses, comparing them to losses from other sources of mortality. When compared to fishing mortality, Kimmerer concluded that “the calculated loss rate at the export facilities would be a significant component

of direct anthropogenic mortality” for Chinook salmon.

The above findings are consistent with those used in the 2008 and 2009 biological opinions on delta smelt and Chinook salmon prepared by federal fisheries experts at US Fish and Wildlife Service and the NOAA National Marine Fisheries Service, respectively, which were summarized previously. The USFWS biological opinion noted, “Increased pumping at the Banks and Jones export facilities corresponds to the decline of the delta smelt population during the period both prior to and following its listing under the Act” (USFWS, 2008 p. 276), and the NMFS biological opinion states that “[T]he long-term operations of the CVP and SWP are likely to jeopardize the continued existence of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, Southern DPS (distinct population segment) of North American green sturgeon, and Southern Resident killer whales” (NMFS, 2009 p. 575).

### **Remedial actions/projects that have been considered/taken by project operators**

Actions aimed to prevent losses of fish at project facilities include the following types of projects, which are described in the following sections:

- Gates and physical barriers;
- Screens and ladders at Delta diversion points;

- Non-physical barriers;
- Pre-screen loss mitigation efforts in Clifton Court Forebay; and
- Efforts to reduce mortality during salvage operations.

### Gates and Barriers

#### *Head of Old River Barrier and the Vernalis Adaptive Management Program*

The South Delta Temporary Barriers Project, initiated as a test project in 1991 and extended for five years in 1996 and again for seven years in 2001, occurred partially in response to a 1982 lawsuit filed by the South Delta Water Agency. The project consists of four rock barriers across south Delta channels which are installed and removed every year, except when prevented by high San Joaquin River flows.

The Barriers Project includes the Head of Old River Barrier (HORB), at the confluence of Old River and the San Joaquin River, which is in place most years since 1963 for 6 weeks in the Fall (September 15-November 30), and was in place for 6 weeks in the Spring (April 15-May 30) in 1992, 1994, 1996, 1997, 2000, 2001, 2002, 2003, and 2004, and 2007. Its purposes related to fish management are:

1. To prevent out-migrating salmon smolts in the San Joaquin River from entering Old River and getting drawn into south Delta export facilities; and
2. To increase attraction flows for upstream migrants by maintaining more of the San Joaquin River outflow within its natural channel.

The remaining three barriers are designed to increase water depths and improve quality



Head of Old River Barrier

for in-Delta agriculture and are installed between April 15-September 30 of each season. The Old River near Tracy barrier (ORT) has been installed since 1991 and the Middle River barrier (MR) has been installed since 1987. A rock barrier in Grant Line Canal (GLC) was first installed in spring 1996, and has since been installed in 1997, 1999, and 2000 through the present. The four rock barriers were not installed in 1998 due to high San Joaquin River flows.

The Vernalis Adaptive Management Plan (VAMP) was officially initiated in 2000 as part of State Water Resources Control Board (SWRCB) Water Right Decision 1641 (D1641), and is a 12-year experimental management program partially designed to determine what impact the HORB has on salmon smolt out-migration success. The plan provides a pulse flow in the San Joaquin River for a 31-day period at Vernalis during April and May and other flows identified by the Central Valley Project Improvement Act water acquisition plan, such as fall attraction flows.

The SWRCB Strategic Workplan for activities in the Delta calls for the review and potential amendment of southern Delta salinity and San Joaquin River flow objectives. The SWRCB requested in 2008 that the San Joaquin River Group Authority

(SJRGA) conduct a peer review of the VAMP to determine whether changes may be needed to the study to obtain necessary data points and to ensure the protection of San Joaquin River and Delta species. In 2009, the SWRCB conducted several workshops concerning potential amendments to San Joaquin River Flow objectives.

In 2008, a court order designed to protect delta smelt prohibited the installation of the spring HORB pending fishery agency actions or further order of the court.

### ***South Delta Improvement Program and NMFS Prohibition***

The South Delta Branch of the Bay-Delta Office of DWR<sup>1</sup> implements projects and actions in the south Delta as part of the CALFED California Bay Delta Authority Conveyance Program. The South Delta Improvement Program (SDIP)<sup>2</sup> was one of the key plans developed by the South Delta branch to implement several elements of the Preferred Alternative outlined in the CALFED Record of Decision (ROD). Stage 1 of the SDIP proposed four actions: (1) replacement of four seasonal rock gates currently installed in the Temporary Barriers Project (a fish barrier at Head of Old River, and three agricultural water control barriers at Old River at Tracy, Middle River, and Grant Line Canal) with permanent operable gates, (2) limited dredging in Middle and Old Rivers and West Canal, (3) extension of 24 existing local agricultural diversions in the south Delta to deeper water, and (4) an increase in the maximum SWP diversion to

---

<sup>1</sup> <http://baydeltaoffice.water.ca.gov/sdb/>.

<sup>2</sup>

[http://baydeltaoffice.water.ca.gov/sdb/sdip/index\\_sdip.cfm](http://baydeltaoffice.water.ca.gov/sdb/sdip/index_sdip.cfm).

8,500 cfs. Although one goal of the gate operations would be to reduce the movement of San Joaquin River fall/late fall–run juvenile Chinook salmon into the south Delta at the Head of Old River, a principal goal is to maintain water levels and water quality for agricultural diversions downstream of the head of Old River. All four proposed gates would be owned, operated, and maintained by DWR.

The SDIP was one of the elements of the SWP/CVP Operations Criteria and Plan (OCAP) analyzed by NMFS in its 2009 biological opinion. NMFS concluded that (1) the design, placement, and operation of permanent gates would create new habitat for predators and increase the proportion of winter-run Chinook salmon that encounter gates from 3% to 100%, (2) fish would have to negotiate an increased number of gates to move through the south Delta compared to the current Temporary Barriers Project, and (3) particle entrainment levels were too high, and the zone of entrainment too large, despite the planned operations of new gates. As a result, NMFS prohibited implementation of the SDIP as Action IV.6 in the Reasonable and Prudent Alternatives (RPAs) of the 2009 biological opinion.

### ***2-Gates Fish Protection Demonstration Project***

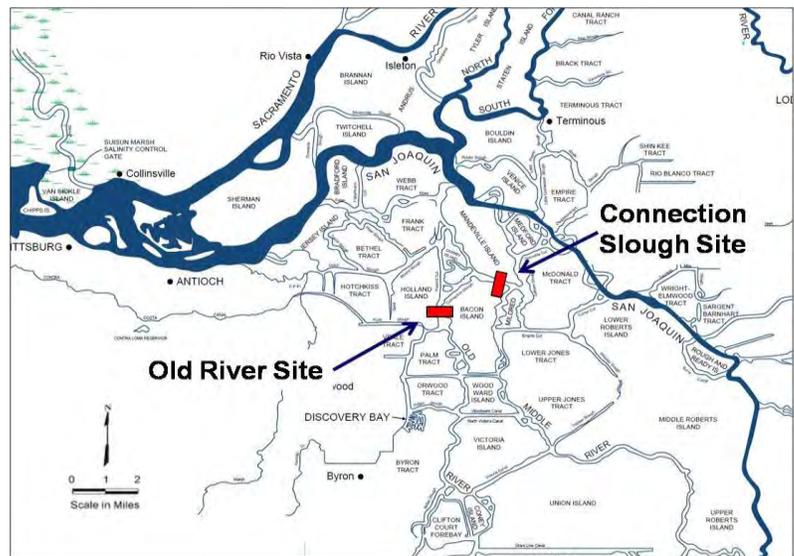
The RPAs in the USFWS (2008) and NMFS (2009) biological opinions for the SWP and CVP include actions to limit reverse flows in Old and Middle Rivers to reduce entrainment of fish at the export facilities. The 2-Gates Fish Protection Demonstration Project was designed by consultants of Metropolitan Water District of Southern California (MWD) and has been proposed as a 5-year adaptive management experiment to justify higher minimum export volumes than outlined in the USFWS and NMFS

biological opinions. A team comprised of staff from MWD<sup>3</sup>, State Water Contractors, CVP contractors, and Contra Costa Water District formed in 2008 to expedite implementation of the project and initiate the environmental documents<sup>4</sup>; the USBR is serving as the project proponent for purposes of environmental review.<sup>5</sup>

The project would use operable gates to modify flows in the central Delta. The justification for the 2-Gates project relies on an observation that high turbidity (in excess of 12-15 NTU) is correlated with and may be a functional cue for the annual spawning migration by delta smelt from Suisun Bay to the Delta, although this theory has only been specifically addressed to date in one peer-reviewed scientific paper (Grimaldo et al. 2009). During high river flow periods, turbidity enters the western Delta from the Sacramento River and the central Delta via Georgiana Slough, and the south Delta through Old River and Middle Rivers. Inflow from the San Joaquin River also contributes a pulse of turbidity, although the timing typically lags behind that from the Sacramento River. When these

two water bodies meet, they form a continuous high turbidity zone which presumably encourages smelt to move south toward the pumps. In the 2-Gates Project, temporary gates would be placed across Old River and Connection Slough in the Central Delta, and operated December-March to

*The 2-Gates Project...has been proposed as a 5-year adaptive management experiment to justify higher minimum export volumes than outlined in the USFWS and NMFS biological opinions.*



keep turbid water away from the export pumps. The purpose of the project is to demonstrate that operable gates, in conjunction with some restriction on negative OMR flows, could provide equal or greater protection for delta smelt than restrictions on reversing flow in Old and Middle rivers.

The CALFED Science Program convened an Independent Review Panel in August 2009 to review the 2-Gates Project Summary Document (MWD 2009, Anderson et al. 2009). The draft environmental assessment for the project was released for review in October 2009 (USBR 2009a, b). One of the California

<sup>3</sup> See minutes of June 9, 2009 MWD Board of Directors meeting and related letter to MWD Board of Directors from Water Planning and Stewardship Committee dated June 9, 2009.

<sup>4</sup> See December 2008 “Bay-Delta Management” report to the MWD Board of Directors.

<sup>5</sup> [http://www.usbr.gov/mpnepa/nepa\\_projdetails.dfm?Project\\_ID=4472](http://www.usbr.gov/mpnepa/nepa_projdetails.dfm?Project_ID=4472)

Senate bills in the comprehensive water package passed in November 2009 (SBX7-1, Delta Governance/Delta Plan) appropriates funding from Proposition 84 to fund the 2-Gates Fish Protection Demonstration Program.

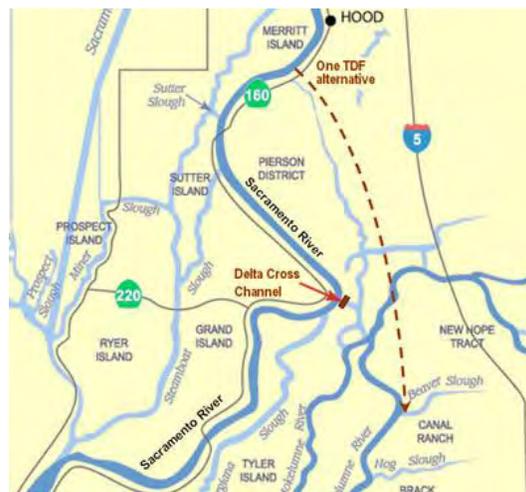
Some of the objections raised regarding the 2-Gates project are:

- (1) That submission of environmental documents consisting of a Finding of No Significant Impact and Mitigated Negative Declaration (as opposed to a full EIS/EIR) is inappropriate for a project whose purpose is to keep an endangered species out of a part of its critical habitat;
- (2) Evaluations of potential impacts to other species (salmon, steelhead, sturgeon, longfin, splittail, threadfin shad, striped bass, etc.) have been cursory, or nonexistent;
- (3) Required authorizations (i.e., Clean Water Act section 404 & 401 permits, streambed authorization agreement, consistency determinations with federal biological opinions, etc.) are on a fast track; and
- (4) RPA IV in the 2009 NMFS biological opinion denied use of similar operable OMR barriers when it prohibited implementation of the South Delta Barriers Improvement Program (Action IV.6).

***Re-Operation of Delta Cross Channel Gates***

The Delta Cross Channel (DCC) was constructed in 1951 to assist in transferring water from the Sacramento River across the Delta. When the gates are open, Sacramento River water is diverted into the north and south forks of the Mokelumne River, and

toward the south Delta pumps. Adult Chinook salmon use the Sacramento River, DCC, and Georgiana Slough as out-migration pathways. A major effect of water operations in the Delta is diversion of out-migrating juvenile salmon from the north Delta tributaries into the interior Delta when the DCC gates are open. Instead of migrating directly to the outer estuary and then to sea, juvenile salmon are caught in the interior Delta and subjected to predators, and altered food webs, and other stressors that may cause direct mortality or impair growth. Investigations in the early 1980's indicated that juvenile winter-run Chinook salmon may be entrained into the interior Delta in proportion to Sacramento River flow diverted through the DCC (Shaffter, 1980). In order to protect out-migrating winter-run Chinook salmon, the DCC gates are operated in accordance with Water Rights Decision 1641 (SWRCB 2000), requiring closure of the gates between February 1-May 20, and intermittent closures of proscribed total duration outside of that period when requested by the USFWS, NMFS, or CDFG for fisheries protection.



**Delta Cross Channel (DCC) location**

The Preferred Program Alternative described in the CALFED (2000) Record of Decision (ROD) included re-operation of the DCC as one of two north-Delta conveyance facilities improvements (the other was a proposed Through Delta Facility [TDF]). In 2001, the CALFED Science Program began a study of the effects of DCC gate operations and tides on flow and fish entrainment. An evaluation by scientists with DWR and DFG found a significant linear relationship between the proportion of Sacramento River flow diverted into the interior Delta and the proportion of the winter-run Chinook salmon population lost at the Project facilities between October and May of each year from 1995-2006 (Low et al., 2006). The study authors concluded that the strength of the observed relationship provided sufficient justification for changes in the decision criteria for DCC gate closures.

From November 2008-February 2009, DWR conducted a study of out-migrating Chinook salmon smolts on the Sacramento River.<sup>6</sup> The salmon investigation was designed to:

- (1) Generate a regional database of out-migration movement, flows, and salinity, leading to a statistical analysis of route selection behaviors and reach specific survival rates; and
- (2) Acquire a 3-dimensional array of salmon and hydrodynamic data at the Sacramento River junctions of Georgiana Slough and the DCC.

Among other things, the study involved releases of acoustically-tagged fish with different DCC gate operations scenarios. A

---

6

<http://baydeltaoffice.water.ca.gov/ndelta/salmon/index.cfm>

CALFED Independent Science Review Panel expressed many concerns with the experimental design (Monismith 2008). Among the panel's comments was that the structure of the review was "somewhat extraordinary (i.e., reviewing a proposal that the funding agency had apparently already selected for funding via a sole-source selection process)." No report is yet available for the study.

**New federal rules imposed in 2009 by the NMFS biological opinion for CVP and SWP operations now require the gates to be closed starting in October for at least three days whenever young salmon are present in the Sacramento River, and during more of the period November-February than was previously required under Water Right Decision 1641.**

### Screens and Ladders at Delta Diversion Points

#### *Fish Screens*

The Preferred Program Alternative outlined by CALFED agencies in the CALFED (2000) ROD recommended that new fish screens be designed and constructed at the Clifton Court Forebay and Tracy Pumping Plant facilities to allow the export facilities to pump at full capacity more regularly. The proposed schedule was:

- Complete funding plan by early 2003.
- Complete facilities design by the middle of 2004.
- Seek funding and authority to complete initial fish screens, and begin operations and performance testing by the middle of 2006.
- In addition, fish screens would be a necessary element of the Through-Delta facility proposed in the CALFED ROD.

### *Lack of Progress on Fish Screens*

By the end of the very first of the post-ROD years (2000-2001), the CALFED Conveyance Program elements for installing fish screens at the Clifton Court Forebay and Tracy facility had already been put on “hold” for “reevaluation” of “scope and schedule” (see Schedule on page 11 in CBDP, 2003). By 2004, the CALFED activity related to fish screens was still on hold, and a new hydrodynamic study appeared to have taken its place as a CALFED action item (CBDP 2005, p. 10).

In the “Accomplishments” section of the 2006 annual plan (CBDP 2006), the scope of the hydrodynamic study referred to above was revealed to include food web components, but not to include research applicable to the design or construction of fish screens (CBDP 2006, p. 6).

After 2005, research priorities related to direct mortality of entrained fish appeared to have mostly shifted toward Capture, Handling, Trucking, and Release aspects of the existing salvage operations (CBDP 2007, p.6). And finally, by 2008, the original project area designated for work on fish screens was renamed from “Clifton Court Fish Screens” to South Delta Fish Facility Improvements (CBDP 2008).

In summary, CALFED apparently abandoned its explicit commitments for installing fish screens at the south Delta diversion points at the very beginning of the post-ROD CALFED program, and as of 2009, had not resurrected fish screens as a CALFED action item or serious subject of research (CBDP 2009).

### *Fish Ladders for a Proposed Through-Delta Facility*

A potential Through-Delta Facility<sup>7</sup> was one of the two north-Delta conveyance facilities improvements included in the Preferred Program Alternative in the 2000 CALFED ROD. The TDF is a proposed screened conveyance which would pump up to 4,000 cfs from the Sacramento River into the Mokelumne River (SVS 2007). This project is distinct from the isolated alternative conveyance currently proposed by the Bay-Delta Conservation Plan (BDCP) because the diverted water would not be delivered directly to the south Delta pumps, but would be discharged into the central Delta. The objective of the proposed diversion is to reduce salinity at the south Delta export locations. Several potential alignments have been studied by DWR consultants.

Were the TDF to be built, anadromous fish migrating upstream from San Francisco Bay could get miscued by Sacramento River water passing into the southern Delta through the TDF and attempt to move upstream toward the Sacramento River via the San Joaquin and Mokelumne Rivers. Upstream migrants which do not find their way back to the Sacramento River via Three Mile Slough, Georgiana Slough or the Delta Cross Channel could be attracted by the TDF discharge. For these migrants, the TDF would serve as a physical barrier. The TDF would need upstream passage facilities for sturgeon and other anadromous fishes in order to ensure their ability to spawn upriver.

The southern distinct population segment (DPS) of the green sturgeon (*Acipenser medirostris*) was listed as threatened under

---

<sup>7</sup> <http://baydeltaoffice.water.ca.gov/ndelta/TDF/>.

the ESA in 2006 and is one of the anadromous species in the Delta that is addressed by the 2009 NMFS biological opinion on the SWP/CVP operations. Owing to their large body size and tendency to remain near the bottom, sturgeon require completely different kinds of fish ladders than salmonids. The DWR Fishery Improvements Section conducted a feasibility/design study for a sturgeon ladder using white sturgeon between 2003-2005 (*Through-Delta Facility White Sturgeon Passage Ladder Study*, Wilde 2007).

### **Non-Physical Barriers**

In May 2009, DWR tested an experimental, non-physical fish barrier for juvenile Chinook salmon and steelhead<sup>8</sup> near the head of the Old River. The barrier combines acoustics and a strobe-lit sheet of bubbles to create an underwater wall of light and sound at frequencies that repel salmon smolts. The bubble-curtain was being tested as a replacement for the HORB to help keep juvenile salmon from straying into Old River as they out-migrate from the San Joaquin River through the Sacramento-San Joaquin Delta. The installation of the spring HORB did not take place in 2009 because of a court order related to the USFWS 2008 biological opinion for delta smelt. VAMP participants decided to test the strobe-lit, sound-generating bubble curtain as an alternative to the rock barrier, which can have adverse hydrodynamic impacts on delta smelt.

Seven releases of hatchery juvenile Chinook salmon implanted with acoustic tags were planned during the pilot study to evaluate their response to the bubble barrier. As of

---

<sup>8</sup> Press release, photos, and video are available at <http://www.water.ca.gov/news/archive/>.

mid-May 2009<sup>9</sup>, preliminary data from the first three releases suggested that the bubble curtain had increased the number of smolts staying in the San Joaquin River during their out-migration to San Francisco Bay and the ocean. However a large percentage of the smolts that were deterred from entering Old River were eaten by striped bass that were patrolling in the vicinity of the bubble curtain (CALFED Science News, December 2009<sup>10</sup>).

### **Mitigation of Pre-Screen Losses in Clifton Court Forebay**

#### ***Alteration of Herbicide Applications***

At certain periods of time, build up of pondweed at the Skinner Fish Facility can result in pumping restrictions. To control this, DWR has applied Copper-based herbicides such as Komeen® in Clifton Court Forebay since 1995, typically during the spring or early summer when listed salmonids have been present in the forebay. These herbicide applications present toxicity issues to salmonids and green sturgeon due to their high sensitivity to copper at both sub-lethal and lethal concentrations. Exposure of green sturgeon to herbicides in Clifton Court Forebay was one of four categories of effects of the Delta Division of SWP/CVP OCAP evaluated by the NMFS (2009) biological opinion. DWR, in response to NMFS' concern over the use of Komeen® during periods when listed salmonids may be present in the Clifton Court Forebay, has altered its operational

---

<sup>9</sup> May 18, 2009, DWR press release, available at: <http://www.water.ca.gov/news/archive/index.cfm?yr=2009>

<sup>10</sup> Available at [http://www.science.calwater.ca.gov/publications/sci\\_news.html](http://www.science.calwater.ca.gov/publications/sci_news.html)

procedure for application of copper-based herbicides from previous operations (NMFS 2009). DWR now proposes to apply copper sulfate or Komeen® only between July 1- August 31 of each year as needed. Other mitigation steps proposed by DWR include the following actions:

- Monitor the salvage of listed fish at the Skinner Facility prior to the application of the herbicides in Clifton Court Forebay;
- Close the radial intake gates at the entrance to Clifton Court Forebay 24 hours prior to the application of herbicides to allow fish to move out of proposed treatment areas and towards the salvage facility;
- Keep the radial gates closed for 24 hours after treatment to allow for at least 24 hours of contact time between the herbicide and the treated vegetation in the forebay. Reopen the gates after a minimum of 48 hours.

Implementation of the shortened period of Komeen® application is scheduled to begin during the summer of 2010.

### ***Predator Removal Studies***

Predator removal investigations were conducted in the 1990's to reduce predation by striped bass in Clifton Court Forebay. As part of the Interagency Ecological Program studies, the DFG estimated that in March 1993, the total striped bass population in the forebay was around 200,000, even after almost 29,000 striped bass were removed in a pilot predator removal program (Brown et al., 1996). The high loss estimates of fish due to striped bass predation in the forebay caused interest in a program to reduce losses by catching striped bass using nets and hauling them for release in San Pablo Bay or other locations far from the forebay, which

was planned for 1994. However, opposition from angler organizations caused the program to be postponed, and in the meantime, results of an acoustic tagging program indicated that striped bass move freely through the radial gates to the Delta, indicating that the effectiveness of planned removal programs may be limited. In the mid-1990's, DWR and DFG were planning studies to further confirm that striped bass move freely between the forebay and the Delta (Brown et al., 1996).

### **Salvage Mortality**

A number of investigations have been conducted into the mechanisms and factors affecting fish survival during the salvage process at both the SWP and CVP fish salvage facilities. The USBR began a Tracy Fish Facility Improvement Program (TFFIP)<sup>11</sup> in 1989. Since then, the TFFIP has implemented a predator removal program, holding tank surveys, secondary louver netting programs, fish egg and larvae entrainment estimates, updated louver efficiency estimates, improved fish handling and identifications, "fish friendly" pumping system, and a "fish friendly" mitten crab removal system (traveling screen). Over three dozen TFFIP reports are posted on-line at: [http://www.usbr.gov/pmts/tech\\_services/tracy\\_research/tracyreports/index.html](http://www.usbr.gov/pmts/tech_services/tracy_research/tracyreports/index.html).

Recent Collection, Handling, Transport and Release research for the SWP's Skinner Facility salvage operation has included an "Element 2" study to assess post-release predation mortality at SWP's Horseshoe Bend release site, and an "Element 3" study to measure injury and mortality associated

---

<sup>11</sup>

[http://www.usbr.gov/pmts/tech\\_services/tracy\\_research/index.html](http://www.usbr.gov/pmts/tech_services/tracy_research/index.html).

with the release of fish from the tank trucks. Element 2 monitoring was scheduled August 2007-April 2008; techniques included Dual Frequency Identification Sonar (DIDSON) camera monitoring, hydroacoustics, acoustic telemetry, avian predation monitoring, and electrofishing. In the Element 3 study in 2007, delta smelt and juvenile Chinook salmon were released through a mock-up of the SWP release site into a receiving tank representing the receiving water body so that injury and mortality could be measured over a 48-hour mock post-release period.

Reports have not been released yet for either study, so it is difficult to know whether the NMFS estimate above 12-32% would apply to delta smelt, as well as salmon smolts.

### **Proposed BDCP conservation measures that address fish loss**

The proposed BDCP includes conservation measures in draft Chapter 3 to address predation of covered fish species and non-physical barriers to re-direct fish away from channels where survival is low. **The BDCP does not propose improvement, enhancement or replacement of the fish screens or salvage facilities in the south Delta, despite the fact that losses are ongoing and will continue into the future with the continued operation of these facilities.**

#### **Predator Controls**

BDCP conservation measure OCSM24 aims to “reduce the effects of predators on covered fish species by conducting localized predator control of high predator density locations.” Predation has been identified as a stressor to covered fish species, and the BDCP recognizes that particular habitat

conditions are conducive to predators. The conservation measure aims to identify the locations of predator hot spots, which are theorized to include areas that favor predators such as deep holes, shaded areas around docks and marinas, abrupt depth changes, and release sites for salvaged fish from CVP/SWP facilities. The conservation measure proposes that methods such as modification of channel geometry and targeted removal of predators could be used to control predator populations.

Interestingly, Clifton Court Forebay is not specifically mentioned, despite being known for decades to be a hot spot for predation of covered fish species. In addition, the fact that permanent operable gates, such as were prohibited in the 2009 NMFS biological opinion, are known predator hot spots, is not mentioned in draft Chapter 3 of the BDCP. This is noteworthy because the operable gates proposed for testing in the 2-Gates Demonstration Project form the basis for BDCP Conservation Measure WOCMN8.

#### **Non-Physical Barriers**

BDCP conservation measure OCSM25 proposes to “improve survival of outmigrating juvenile salmonids by using non-physical barriers to re-direct them away from channels in which survival is lower.” The proposed barriers would consist of sound, light and bubbles, such as were used in the 2009 DWR “bubble curtain” at HORB previously described. The list of potential locations for barrier installation includes Clifton Court Forebay. However, as explained previously, it is now known that non-physical barriers – such as bubble curtains – can serve as predator hot spots.

---

## Moving Forward...

There is a large body of evidence that indicates that high percentages of covered fish species are lost due to SWP and CVP pumping operations in the south Delta. As captured in the above discussion, information indicates that the direct loss of various species of fish in and around the south Delta pumping facilities is significant, historic, and ongoing. Studies showing high mortality date back to the 1970s. Mitigation efforts to reduce losses have been suggested repeatedly over the past two decades but have either not been implemented or have been shown to not be successful.

Population level effects from mortality due to pumping operations are potentially significant. In contrast, evidence of direct loss of fish attributable to adverse water quality

*Studies showing high mortality date back to the 1970s, and mitigation efforts to reduce losses have been suggested repeatedly over the past two decades. Population level effects from mortality due to pumping operations are potentially significant.*

conditions; agricultural, stormwater and wastewater discharges, is generally lacking.

As seen in the mitigation section of this paper, recent mitigation actions to protect fish from pumping operations primarily focus on physical devices such as gates. Less attention has been focused on improving fish screens, despite that being noted as a priority mitigation area in reports dating back to the mid 1990s. Little has been done to prevent fish from entering Clifton Court Forebay or to reduce the effects of predation.

### Data and Research Gaps

In terms of direct loss of fish, clearly more effort is needed to develop feasible measures to reduce the ongoing loss of listed species that are entrained as a result of SWP and CVP operations.

In terms of indirect losses, the science supporting various hypotheses that have been offered (food web disruption, sublethal toxicity, proliferation of nuisance aquatic species) is less clear, and continued research is needed to explore the validity of those hypotheses. It is interesting to note the level of interest generated in the past several years around specific indirect stressors (ammonia, pyrethroids, endocrine disruptors, nutrients) that are not associated with Delta export operations. In contrast, there has not been a similar interest to examine the indirect effects associated with the loss of nutrients, phytoplankton and zooplankton from the Delta and the modification of hydrodynamic and habitat regimes in the Delta due to export operations.

More research is needed to investigate the extent to which fish populations are impacted as a result of altered hydrodynamic conditions. Indirect losses of fish due to pumping operations may be large, but have not yet been quantified. Mark-recapture investigations were intended to study indirect losses, but have not provided insight into their magnitude (Kimmerer, 2008).

## **In Summary: A Call to Action**

For 30 years scientists and regulatory agencies have documented the significant impacts the water export operations have on Delta fish – and yet little action has been taken to correct the situation. When the POD signaled the Delta ecosystem is in real trouble a few years ago, the response was to shift the blame from the known impacts of the water exports to potential other “stressors.”

Certainly, more research must be done to fully understand all of the issues that may be affecting the health of the Delta and what action should be taken to address them, but the comprehensive and integrative research needed to yield sound data on these issues will take years. In the meantime, immediate action should be taken to mitigate the known and well documented impacts of the water exports on the Delta ecosystem and endangered fish species. Too much is at stake to allow further delay in addressing the ongoing fish mortality associated with the water project operations, especially when the evidence paints such a clear picture. ■

**References**

- Anderson, J., A. Blumberg, P. Goodwin, S. Monismith, C. Simenstad. 2009. Science review of the two gates project, Report prepared for CalFED Science Program, Sept. 29, 2009. 32 pp. Avail. at: [http://science.calwater.ca.gov/events/reviews/review\\_2gates.html](http://science.calwater.ca.gov/events/reviews/review_2gates.html).
- Bennett, WA. 2005. Critical assessment of the delta smelt population in the San Francisco Estuary, California. San Francisco Estuary and Watershed Science. 3(2). Available at: <http://repositories.cdlib.org/jmie/sfews/vol3/iss2/art1>
- Bowen M.D., Baskerville-Bridges BB, Frizel KW, Hess L, Carp CA, Siegfried SM, Wynn SL. 2004. Empirical and experimental analyses of secondary louver efficiency at the Tracy Fish Collection Facility, March 1996 to November 1997. Tracy Fish Facility Studies: Volume 11. U.S. Bureau of Reclamation, Mid Pacific Region and Denver Technical Service Center.
- Brown R, S. Greene, P. Coulston and S. Barrow. 1996. An evaluation of the effectiveness of fish salvage operations at the intake to the California aqueduct, 1979-1993. Pages 497-518 in J. T. Hollibaugh, ed. San Francisco Bay: the ecosystem. Pacific Division of the American Association for the Advancement of Science, San Francisco..
- California Bay Delta Program (CBDP). 2003. California Bay Delta Program, Conveyance Program, Multi-Year Program Plan (Years 4-7). CalFed Bay-Delta Program, August 2003. Avail. at: <http://www.calwater.ca.gov/calfed/plans/index.html>.
- California Bay Delta Program (CBDP). 2005. California Bay Delta Program, Conveyance Program, Multi-Year Program Plan (Years 6-9). CalFed Bay-Delta Program, October 2005. Avail. at: <http://www.calwater.ca.gov/calfed/plans/index.html>.
- California Bay Delta Program (CBDP). 2006. Draft. Conveyance Program, Program Plan Year 7. CalFed Bay-Delta Program, August 3, 2006. Avail. at: <http://www.calwater.ca.gov/calfed/plans/index.html>.
- California Bay Delta Program (CBDP). 2007. Draft Final. Conveyance Program, Program Plan Year 8. CalFed Bay-Delta Program, October 30, 2007. Avail. at: <http://www.calwater.ca.gov/calfed/plans/index.html>.
- California Bay Delta Program (CBDP). 2008. Final Draft. Conveyance Program, Program Plan Year 9. CalFed Bay-Delta Program, September 10, 2008. Avail. at: <http://www.calwater.ca.gov/calfed/plans/index.html>.
- California Bay Delta Program (CBDP). 2009. Final Draft. Conveyance Program, Program Plan Year 10. CalFed Bay-Delta Program, July 1, 2009. Avail. at: <http://www.calwater.ca.gov/calfed/plans/index.html>.
- CALFED Programmatic Record of Decision (2000), CALFED Bay-Delta Program, avail at: [http://calwater.ca.gov/calfed/library/Archive\\_ROD.html](http://calwater.ca.gov/calfed/library/Archive_ROD.html).

## ATTACHMENT FOUR

---

- Clark K., M. Bowen, R. Mayfield, K. Zehfuss, J. Taplin, C. Hanson. 2009. Quantification of pre-screen loss of juvenile steelhead in Clifton Court Forebay. Department of Water Resources, The California Natural Resources Agency.
- Gingras M. 1997. Mark/recapture experiments at Clifton Court Forebay to estimate prescreening loss to juvenile fishes: 1976-1993. Technical Report 55. Interagency Ecological Program.
- Kimmerer W. 2008. Losses of Sacramento River Chinook salmon and delta smelt to entrainment in water diversions in the Sacramento-San Joaquin. San Francisco Estuary & Watershed Science, June 2008.
- Kjelson M, Brandes P. 1989. The use of smolt survival estimates to quantify the effects of habitat changes on salmonid stocks in the Sacramento-San Joaquin Rivers, California. In Levings C., Holtby L., Henderson M. (eds) Proceedings of the National Workshop on Effects of Habitat Alteration on Salmonid Stocks., Canadian Special Publication of Fisheries and Aquatic Sciences 105. p. 100-115.
- Low A, White J, Chappell E. 2006. Relationship of Delta Cross Channel Gate operations to loss of juvenile winter-run Chinook salmon at the CVP/SWP Delta facilities. California Department of Fish and Game and Department of Water Resources.
- Metropolitan Water District of Southern California (MWD). 2009. 2-Gates Fish Protection Demonstration Project. Summary Document. Prepared for the CALFED Science Program Independent Review Panel, July 16, 2009. 43. pp. Avail at: [http://science.calwater.ca.gov/events/reviews/review\\_2gates.html](http://science.calwater.ca.gov/events/reviews/review_2gates.html).
- Meyer J, Mulholland P, Paerl H, Ward A. 2009. A Framework for Research Addressing the Role of Ammonia/Ammonium in the Sacramento-San Joaquin Delta and the San Francisco Bay Estuary Ecosystem. Submitted to the CALFED Science Program, April 13, 2009. Avail at: [http://science.calwater.ca.gov/pdf/workshops/workshop\\_ammonia\\_research\\_framework\\_final\\_041609.pdf](http://science.calwater.ca.gov/pdf/workshops/workshop_ammonia_research_framework_final_041609.pdf)
- Monismith S, Simenstad S, Denton R, Newman K, Bennett W, Rondorf D, and Rose K. 2008. Review of North Delta salmon out-migration study, January 23, 2008. Avail. at: [http://baydeltaoffice.water.ca.gov/ndelta/salmon/documents/CALFED\\_ReviewPanelList.pdf](http://baydeltaoffice.water.ca.gov/ndelta/salmon/documents/CALFED_ReviewPanelList.pdf).
- National Marine Fisheries Service (NMFS). 2009. Biological opinion and conference opinion on the long-term operations of the Central Valley Project and State Water Project. ESA Section 7 Consultation. National Marine Fisheries Service, Southwest Region, Long Beach, CA. June 4, 2009. 844 pp. Avail at: [http://swr.nmfs.noaa.gov/sac/myweb8/webpages/biol\\_opinions.htm](http://swr.nmfs.noaa.gov/sac/myweb8/webpages/biol_opinions.htm).

## ATTACHMENT FOUR

---

- Shaffter R. 1980. Fish occurrences, size and distribution in the Sacramento River near Hood, California during 1973 and 1974. California Fish and Game Anadromous Fish Branch Admin Report 80-3. 76 pp.
- State Water Resources Control Board (SWRCB). 2000. Revised Water Right Decision 1641. Available at:  
[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/bay\\_delta/decision\\_1641/index.shtml](http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/decision_1641/index.shtml).
- State Water Resources Control Board (SWRCB). 2008. Strategic Workplan for Activities in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. Available at:  
[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/bay\\_delta/](http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/)
- Stevens DE, Kohlhorst, DW, Miller LW, Kelley DW. 1985. The decline of striped bass in the Sacramento-San Joaquin Estuary, California. Transactions of the American Fisheries Society 114(1):12-30.
- Strategic Value Solutions, Inc. (SVS). 2007. Final Value Planning Study Report for Through Delta Facility, Sacramento, California. Prepared for the Delta Conveyance Branch, Bay-Delta Office, California Department of Water Resources, June 2007. Avail at:  
<http://baydeltaoffice.water.ca.gov/ndelta/TDF/>. 167 pp.
- U.S. Bureau of Reclamation (USBR). 2009a. Draft finding of no significant impact, 2-Gates Fish Protection Demonstration Project. FONSI-09-154. United States Department of the Interior, Bureau of Reclamation, Mid Pacific Region. Avail at:  
[http://www.usbr.gov/mp/nepa/nepa\\_projdetails.cfm?Project\\_ID=4472](http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=4472).
- U.S. Bureau of Reclamation (USBR). 2009b. 2-Gates Fish Protection Demonstration Project, Central Valley Project, California. Draft Environmental Assessment. United States Department of the Interior, Bureau of Reclamation, Mid Pacific Region. Avail at:  
[http://www.usbr.gov/mp/nepa/nepa\\_projdetails.cfm?Project\\_ID=4472](http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=4472).
- U.S. Fish and Wildlife Service (USFWS). 2008. Biological opinion on the coordinated operations of the Central Valley Project (CVP) and State Water Project (SWP). Final. December 15, 2008.
- Wilde J. 2007. Modeling of Value Engineering study alternatives for the Through Delta Facility. Technical memorandum prepared for the Delta Conveyance Branch, Bay-Delta Office, California Department of Water Resources, Sept. 25, 2007, avail. at:  
<http://baydeltaoffice.water.ca.gov/ndelta/TDF/>.

---

*This report was prepared by Larry Walker Associates, January 2010, for Sacramento Regional County Sanitation District, Sacramento, CA*

## Attachment Five

### **List of Recent Werner Research Publications**

Werner I., D. Markiewicz, L.A. Deanovic, R.E. Connon, S. Beggel, S.J. Teh, M. Stillway, and C. Reece. 2010b. Pelagic Organism Decline (POD): Acute and Chronic Invertebrate and Fish Toxicity Testing in the Sacramento-San Joaquin Delta 2008-2010. Final Report.

Werner, I., L. Deanovic, D. Markiewicz, M. Stillway, J. Khamphanar, N. Offer, R. Connon, and S. Beggel. 2008b. Pelagic Organism Decline (POD): Acute and Chronic Invertebrate and Fish Toxicity Testing in the Sacramento-San Joaquin Delta 2008-2010, Progress Report. September.

Reece, C., D. Markiewicz, L. Deanovic, R. Connon, S. Beggel, M. Stillway, and I. Werner. 2009. Pelagic Organism Decline (POD): Acute and Chronic Invertebrate and Fish Toxicity Testing in the Sacramento-San Joaquin Delta 2008-2010, Progress Report III. September.

Werner, I., C. Irvine, and C. Foe. 2008a. The Effects of Wastewater Treatment Effluent-Associated Contaminants on Delta Smelt. Ammonia Toxicity Sampling and Analysis Plan. Final. July.

Werner I., L.A. Deanovic, M. Stillway, and D. Markiewicz. 2009a. Acute Toxicity of Ammonia/um and Wastewater Treatment Effluent-Associated Contaminants on Delta Smelt. Final Report to the Central Valley Regional Water Quality Control Board, Rancho Cordova, CA.

Werner I., L.A. Deanovic, M. Stillway, and D. Markiewicz. 2009b. Acute Toxicity of Ammonia/um and Wastewater Treatment Effluent-Associated Contaminants on Delta Smelt - 2009. Final Report to the Central Valley Regional Water Quality Control Board, Rancho Cordova, CA.

Werner, I., L.A. Deanovic, M. Stillway, and D. Markiewicz. 2010a. Acute Toxicity of SRWTP Effluent to Delta Smelt and Surrogate Species. Draft Final Report Submitted to the Central Valley Regional Water Quality Control Board on August 23, 2010.