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California Regional Water Quality Control Board Central Valley Region

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Edmund G. Brown Jr.
Governor

TO: James Herink
Staff Counsel

FROM: Pamela C. Creedon
Executive Officer

DATE: 4 May 2011

SIGNATURE: 

SUBJECT: **PETITIONS FOR REVIEW OF WASTE DISCHARGE REQUIREMENTS, ORDER NO. R5-2010-0114 (NPDES NO. CA0077682) AND TIME SCHEDULE ORDER NO. R5-2010-0115, SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT, SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT, SACRAMENTO COUNTY**

**SWRCB/OCC FILES A-2144(a) AND A-2144(b)
CENTRAL VALLEY WATER BOARD RESPONSE**

INTRODUCTION

The State Water Resources Control Board (State Water Board) has determined that the January 2011 petitions filed by the Sacramento Regional County Sanitation District (Discharger, District, or SRCSD) and the California Sportfishing Protection Alliance (CSPA) to review Waste Discharge Requirements (WDR) Order R5-2010-0114 (Adopted Permit) and Time Schedule Order R5-2010-0115 for the Sacramento Regional Wastewater Treatment Plant are complete. The State Water Board has requested that the Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) provide the record of decision, as well as respond to the petitions. The record of the Central Valley Water Board's decision was delivered to the State Water Board on 4 May 2011. By this memorandum, I am providing the Central Valley Water Board's response to the petitions.

OVERVIEW

The Sacramento Regional Wastewater Treatment Plant (Facility or SRWTP) is the single largest municipal wastewater discharger in the Central Valley Region, and the largest discharge of municipal wastewater to fresh water in the State. The Facility, constructed in the early 1980's, provides a secondary level of treatment with chlorination and dechlorination, and has not been significantly upgraded since originally constructed. Treated wastewater is discharged to the Sacramento River within the Sacramento-San Joaquin Delta (Delta).

A major contention of the Discharger is that there is not sufficient scientific justification for many of the more stringent effluent limitations contained in the Adopted Permit. We strongly disagree. The Delta is complex and is not fully understood after many decades of study. The Central Valley Water Board has worked closely with the following federal and State agencies

California Environmental Protection Agency

to understand the water quality issues in the Delta and the existing and potential impacts due to the municipal wastewater discharge from the Facility:

- USEPA,
- US Fish and Wildlife Service,
- National Marine Fisheries Service,
- California Department of Fish and Game,
- California Department of Public Health, and the
- Delta Stewardship Council

The Central Valley Water Board considered public comments from these agencies in adopting the discharge requirements in the Adopted Permit that are protective of the beneficial uses of the Delta. We may not be able to predict all the impacts of the District's wastewater discharge, but we have firm, scientific evidence that the existing discharge is adversely impacting the Delta, and there is no need to delay imposing more stringent discharge limitations to reduce, minimize and prevent further impacts.

As you are well aware, the Delta has serious water quality and aquatic life impairments that harm not just the Delta, but impact the quality and availability of water diversions from the Delta and downstream into southern California. The Delta is the source of drinking water to over 25 million Californians and is the irrigation water supply supporting \$27 billion in agricultural production annually. There are 12 million recreation user-days in the Delta each year. The Delta supports ecologically important aquatic habitats that support about 280 species of birds and 50 species of fish, including many species of special concern which are or may be directly or indirectly impacted by the current Pelagic Organism Decline (POD). Wastewater discharges are identified as one contributing cause to the POD.

The *Sacramento-San Joaquin Delta Reform Act* emphasized the importance of the Delta, and established the Delta Stewardship Council to provide the best possible, unbiased scientific information to inform water and environmental decision making in the Delta. The Delta Stewardship Council developed an *Interim Delta Plan*, which includes a requirement that Regional Water Boards reevaluate wastewater treatment plant discharges that might impact Delta waters and set discharge requirements at levels that are fully protective of human health and ecosystem needs. While the specific requirements of the Adopted Permit were not required by the Delta Stewardship Council, the Order clearly meets the intent of the Delta Interim Plan. These are issues of importance to the Central Valley Region and the State, as a whole.

Studies specific to the District's discharge and of the Delta show that the discharge significantly impacts Delta waters and the aquatic environment. In particular:

- Existing ammonia concentrations are toxic to algae and invertebrates as far as 58 miles downstream at Suisun Bay, having impacts not just on the lower end of the Delta food web, but potentially impacting rare and endangered fish¹.

¹ See Transcript at p. 79 noting that ammonia impacts the basic parts of the food web and that essentially all of the ammonia comes from the District, and that the ammonia impacts have been traced all the way to Suisun Bay where it is causing problems. See also Transcript at p. 84, noting that it is very clear from the science that the District's discharge is either killing or inhibiting the growth of diatoms and copepods and that these are

- Existing oxygen demanding substances in the discharge lower the dissolved oxygen concentrations in the Sacramento River for many miles downstream of the discharge. California Department of Water Resources data show that dissolved oxygen concentrations at Hood (8 miles downstream of the discharge) are periodically below the Basin Plan dissolved oxygen water quality objective.²
- The Facility's existing chlorination disinfection system allows high concentrations of *Cryptosporidium* and *Giardia* to enter the river, increasing the risk of infection and disease to people who contact Sacramento River water downstream of the discharge.³

To address these and other water quality and public health concerns, the Adopted Permit includes the following:

- Denial of an acute aquatic toxicity mixing zone. The previous permit adopted in the year 2000 allowed an acute toxicity mixing zone that occupies much of the cross section of the Sacramento River, primarily for the purpose of granting dilution for ammonia in the discharge. A mixing zone allows for a portion of the receiving water to contain toxicity, which could impact both local aquatic life and fish migrating up and down the Sacramento River. With the strong recommendation of the federal and State fishery agencies, the Central Valley Water Board made a policy decision that the acute toxicity mixing zone was not appropriate for such a sensitive water body and is no longer allowed. Therefore, acute toxicity water quality objectives are now applied at "end-of-pipe." Chronic aquatic toxicity and harmonic human health constituent mixing zones are however allowed in the Adopted Permit.
- Ammonia Removal. The previous permit did not include an effluent limit for ammonia, instead granting the Discharger significant dilution to comply with USEPA ammonia criteria outside of the mixing zone. Because of demonstrated aquatic toxicity, lowered dissolved oxygen impacts when the ammonia is oxidized to nitrate, potential nutrient stimulation in the Delta and export areas, and antidegradation issues, final ammonia effluent limits were prescribed in the Adopted Permit, therefore requiring the Discharger to include a nitrification process in its treatment facility. The new final ammonia effluent limitations implement *USEPA Ammonia Criteria* at "end-of-pipe" without dilution. The effluent limits are essentially the same as ammonia limits currently being met by the Cities of Lodi, Manteca, Stockton and Tracy, and the Mountain House Community Service District wastewater treatment plants which discharge into the Delta.
- Nitrate Removal. The District's discharge currently contains almost no nitrate, but the nitrate concentration will increase above the drinking water standards established by the California Department of Public Health (Maximum Contaminant Level, MCL) when the ammonia removal process is implemented, thus converting the existing ammonia into nitrate. The nitrate MCL of 10 mg/L (as N), was applied as a final effluent limitation at

important parts of the system. See also Transcript at p. 85 noting that there is presently a problem with ecosystem impacts and there is solid science to support the upgrades to the District's wastewater treatment plant to protect the aquatic ecosystem. See also Transcript at p. 86 noting that existing Delta policies are not sustainable to maintain the system. (SRCSD_BM_13)

² Basin Plan, page III-5.

³ Low Dissolved Oxygen Prevention Assessment (LDOPA), May 2010 (SRCSD_OTHER_156)

"end-of-pipe" without dilution. The combination of the ammonia and nitrate final effluent limitations will significantly reduce the nitrogen discharge, reducing nutrient stimulation in the Delta and in water export areas, and reduce nitrogen impacts on Delta aquatic life. The effluent nitrate limits are essentially the same as nitrate limits currently being met by the Cities of Lodi, Manteca and Tracy, and the Mountain House Community Service District wastewater treatment plants which discharge into the Delta.

- Tertiary Filtration⁴. Improved effluent disinfection is required in the Adopted Permit to reduce pathogen discharges to the Sacramento River. A health risk study conducted by the Discharger shows that the existing discharge increases the health risk to the public contacting the Sacramento River water downstream of the discharge.⁵ Title 22⁶, or equivalent, disinfection will eliminate the increased pathogen health risk. Additionally, the improved treatment will improve removal of biochemical oxygen demand, total suspended solids, metals, organics, pesticides, constituents of emerging concern (CECs), and other pollutants, and is considered Best Practicable Treatment or Control for this discharge.⁷ Title 22, or equivalent, disinfection is required and in place at the Cities of Lodi, Manteca, Stockton, and Tracy, and the Mountain House Community Service District wastewater treatment plants which discharge into the Delta.
- Denial of Expanded Thermal Plan Exception. The Discharger had requested a further relaxation of thermal discharge standards over the existing Thermal Plan exception granted in the previous permit. The request was denied because of concerns expressed by federal and State fishery agencies. The Adopted Permit requires the Discharger to conduct a study to determine whether the current or expanded Thermal Plan exemption is protective of local and migratory fish.

The District has contested virtually every new and/or more stringent effluent limitation in the Adopted Permit. The District's arguments fall into a few basic areas:

1. The District contends that the Central Valley Water Board must grant their requests unless we can demonstrate that its discharge is causing an adverse water quality impact. This is backwards. The Central Valley Water Board can not allow a surface water discharge through adoption of an NPDES Permit unless the Discharger demonstrates that the discharge is fully protective of beneficial uses and fully complies with laws and regulations.

⁴ Within the context of this memorandum, tertiary filtration, tertiary-level treatment, tertiary treatment, and Title 22 (or equivalent) disinfection are equivalent and used interchangeably throughout this memorandum.

⁵ See Transcript at pp. 97-98 noting that a single controllable source of pathogens should not be allowed to increase the pathogen risk level up to the Beach Standard; see also Transcript at p. 98 noting that the District's discharge is a single controllable source of pathogens and that the technology is feasible and reasonable to remove the pathogens and is a technology already in use by many Central Valley Region Dischargers. (SRCSD_BM_13)

⁶ California Code of Regulations, Title 22, division 4, chapter 3 – Department of Public Health reclamation requirements

⁷ See Transcript at p. 77 noting that practicable technology to achieve these effluent limits does exist and is in use currently, such use is economically feasible, and those communities that have built and are operating their wastewater treatment plants to comply with similar limits currently have sewer use rates that are lower than what the District is estimating their future rates for compliance will be. (SRCSD_BM_13)

2. The District contends that only direct impacts to fish, and particularly to Delta smelt, are of concern. This is incorrect. Protection of the aquatic life beneficial use requires protection of the entire aquatic ecosystem. The discharge does kill or inhibit diatoms and other invertebrates that are important parts of the Delta aquatic food web. With the current Pelagic Organism Decline in the Delta, it is not unreasonable to conclude that limiting or changing the food supply for Delta fish and aquatic species will harm the fish, although that impact is not directly proven. The Central Valley Water Board does not need to wait until the entire Delta ecosystem is fully understood in order to implement waste discharge requirements necessary to improve effluent quality that will contribute to the elimination of known Delta impacts.
3. The District contends that if assimilative capacity is available, it must be granted. Under both federal and State law, the discharge of a waste to a Water of the United States is a privilege, not a right. The granting of dilution is discretionary for the Regional Water Board. The Adopted Permit limits the amount of assimilative capacity granted to the District for certain constituents where scientific evidence demonstrates the discharge may cause or contribute to current adverse impacts or an exceedance to water quality criteria/objectives. Dilution is granted for some constituents, however, as documented in the Fact Sheet of the Adopted Permit.

The renewed NPDES Permit adopted in December 2010 for the District's discharge is scientifically based and necessary to correct existing ecosystem and public health impacts in the Delta and prevent the discharge from causing or contributing to an exceedance of water quality criteria/objectives in the Sacramento River. We request that the State Water Board support the NPDES Permit as adopted.

BACKGROUND

The District owns and operates the Sacramento Regional Wastewater Treatment Plant (Facility or SRWTP). The Facility was constructed in 1982 and provides "secondary" level treatment.⁶ The District provides sewerage service to the Cities of Sacramento, Folsom, West Sacramento, and the Sacramento Area Sewer District service area. The Sacramento Area Sewer District service area includes the Cities of Elk Grove, Rancho Cordova, Citrus Heights, as well as, portions of the unincorporated areas of Sacramento County. The population served is approximately 1.3 million people. The Facility discharges disinfected secondary treated wastewater to the Sacramento River, located within the Sacramento-San Joaquin Delta (Delta), a water of the United States.

The Facility is staffed and operated 24 hours per day and consists of influent pumps, septage receiving station, mechanical bar screening; aerated grit handling, grit classifiers that wash and dewater grit, covered primary sedimentation tanks, pure oxygen activated sludge treatment, secondary sedimentation, disinfection with chlorine and dechlorination with sulfur dioxide. Effluent can be diverted to lined and unlined emergency storage basins as needed to meet effluent dilution, thermal, and disinfection requirements or divert excess influent flows. Odors are controlled through stripping towers.

⁶ There has been no major upgrade of the District's facility since 1982. (Transcript at p. 143.) (SRCSD_BM_13)

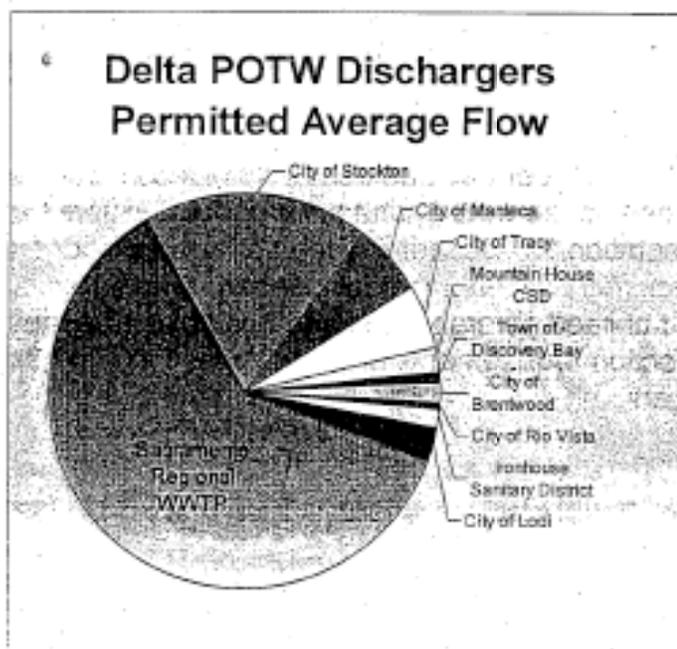
Solids are thickened by dissolved air floatation and gravity belt thickeners. Primary and secondary sludge is mixed and sent to anaerobic digesters for fifteen days, stored at the solids storage basins for three to five years then harvested and injected into lined onsite dedicated land disposal units. Some biosolids are recycled with the Synagro Organic Fertilizer Company and the Discharger can dispose of the remaining sludge at the Sacramento County Kiefer Landfill as a disposal option. Separate Waste Discharge Requirements (Order R5-2003-0076) in conformance with Title 27, California Code of Regulations, Division 2, Subdivision 1 regulate the biosolids and solids storage and disposal facilities, the Class II dedicated land treatment units, unclassified solids storage basins, the Class III grit and screenings landfill closure and the groundwater Corrective Action Program (CAP).

The Facility discharges to the Sacramento River just downstream of the Freeport Bridge via an outfall diffuser. The outfall diffuser is approximately 300 feet long with 74 10-inch diameter ports and is placed perpendicular to the river flow. The Sacramento River is approximately 600 feet wide at the river surface, with a bottom width of approximately 400 feet at the point of discharge.

The current average dry weather flow (ADWF) is 141 mgd and the Facility has a design ADWF capacity of 181 mgd. The Discharger proposed to expand the treatment plant capacity to 218 mgd as described in the "Draft Environmental Impact Report (EIR) for the Sacramento Regional County Sanitation District – Sacramento Regional Wastewater Treatment Plant 2020 Master Plan", August 2003 and the Responses to Comments and Additional Information Sacramento Regional County Sanitation District – Sacramento Regional Wastewater Treatment Plant 2020 Master Plan", 21 May 2004. However, the EIR for the wastewater treatment plant expansion was successfully challenged by the Contra Costa Water District. On 11 June 2010, the Discharger withdrew its request for increasing the SRWTP discharge from 181 mgd to 218 mgd. The Discharger cited slow growth and potential reclamation as the reasons not to expand the wastewater treatment plant at this time.

The Facility is a regional wastewater treatment plant. The Facility's current permitted discharge of 181 mgd represents nearly 60% of all publicly-owned treatment works (POTW) discharges to the Delta as shown in Figure 1, below.

Figure 1 – Delta POTW Dischargers based on Permitted Flow



Most wastewater treatment facilities that discharge within the Central Valley Region have upgraded their facilities to tertiary filtration and nitrification/denitrification (i.e., ammonia/nitrogen removal). Sacramento Regional Wastewater Treatment Plant, the largest facility, is one of three POTWs that discharge to the Delta that have remained at secondary treatment. (The other two facilities are Discovery Bay at 2.1 mgd and one of the Rio Vista facilities at 0.65 mgd.) Prior to adoption of the December 2010 permit, the District's NPDES permit had not changed significantly since the regional facility first began operations nearly three decades ago, yet there have been many negative changes to the water quality of the Delta.

CENTRAL VALLEY WATER BOARD PERMITTING ACTIVITIES

The Central Valley Water Board issued a Tentative Order for public review on 3 September 2010, to the Discharger and all interested parties. Written comments were due on 8 October 2010. However, 8 October 2010 was a State furlough day, thus the comment period was extended to 11 October 2010. A Public Hearing was held on 9 December 2010, and notification to the public was provided through publication of a notice of public hearing in the Sacramento Bee on 8 September 2010. The tentative permit and notice of public hearing were additionally posted on the Central Valley Water Board's internet website during the public comment period and for a ten-day period prior to the Central Valley Water Board meeting. The Discharger submitted written comments on 11 October 2010 and CSPA submitted written comments on 8 October 2010. The Central Valley Water Board provided a response to those comments, and all other comments submitted during the public comment period, as part of the agenda package, which was posted with the Central Valley Water Board agenda.

WDR Order R5-2010-0114 and Time Schedule Order R5-2010-0115 for the Sacramento Regional Wastewater Treatment Plant were adopted by the Central Valley Water Board on 9 December 2010.

RESPONSES TO PETITIONER'S ARGUMENTS

The following are the Central Valley Water Board's responses to discrete contentions raised in the petitions. For convenience, the responses are correlated to the issues as they appear in the petitions. Responses to the Discharger's petition begin immediately below, while responses to CSPA's petition begin on page 85.

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT SWRCB/OCC FILE A-2144(a)

STATEMENT OF POINTS AND AUTHORITIES

I. INTRODUCTION

It has been suggested by the District that the Central Valley Water Board was too committed to certain outcomes and did not consider all relevant information. This is not correct. All available information was evaluated and considered. The District does not agree with the Central Valley Water Board's interpretation of the information. The District continues to contend that the science is not sound and that the Central Valley Water Board

does not have sufficient understanding of the Delta ecosystem to make permitting decisions at this time. Oppositely, the science is sound. Available scientific information and data demonstrates that the discharge is causing or contributing to impacts on aquatic life in the Delta and/or exceedances of water quality objectives. The Clean Water Act and California Water Code require that the Central Valley Water Board act to eliminate these known impacts.

There have been numerous scientific studies conducted on the Delta, and there will continue to be more studies. The Water Boards helped fund part of the research efforts that clarified questions significant to the development of the Adopted Permit. Sufficient scientific information was available at the time of the development of the permit to make permitting decisions. Science will continue to build, and new data will be collected. The science regarding the aquatic impacts addressed in the Adopted Permit and the specific permit requirements to address these issues have been affirmed by the Lead Scientist of the Delta Stewardship Council, and experts at the National Marine Fisheries Service, the United States Fish and Wildlife Service, USEPA, and the California Department of Fish and Game.

II. BACKGROUND

There is no question that the District has a good compliance history.⁹ The District continues to use its good compliance history as a basis of its contention with the Adopted Permit. The Central Valley Water Board expects all its Dischargers to comply with their waste discharge requirements, therefore the District's compliance history has no effect on the permitting decisions in the Adopted Permit. The permit was developed based on the need to protect the beneficial uses and address antidegradation of the Sacramento River, the Delta, and downstream users of these surface waters.

The District contends that the permit process was rushed and that additional time should have been taken to better understand the science. This permit was not rushed. Central Valley Water Board staff allowed the Discharger extensive time to develop its dynamic model and the accompanying studies for antidegradation, dissolved oxygen and thermal impact analyses. Years of work went into development of the permit, which is why renewal was more than 5 years overdue. Several changes were made to the tentative permit based on public comments received. All changes were based on comments and were logical outgrowths of the tentative permit. Other than the fact that the number of comment letters was much greater than usual¹⁰, the process the Central Valley Water Board took for the District was consistent with the public process for all NPDES permits. The Central Valley Water Board considered all timely comments and adequately responded to the comments via an extensive Response to Comments document.

⁹ The fact is that the District's previous permit was ten years old. Compliance with secondary treatment standards has been a minimum national expectation of all publicly owned treatment plants since the District's secondary facility was built in the early 1980s.

¹⁰ Most of the comments were from citizens within the District's service area. Extensive media coverage tended to focus on costs of treatment system upgrades. The District sent a flyer to all residents warning of massive rate increases if the proposed permit was adopted, which generated significant public participation.

III. REQUEST FOR CONSIDERATION OF SUPPLEMENTAL EVIDENCE

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

The District submitted a memorandum dated 9 December 2010 to Mr. David Coupe, Central Valley Water Board staff counsel, on the morning of the hearing and requested that the memo be admitted as part of the administrative record. The District proffered the memo, in part, to point out certain purported deficiencies in the Central Valley Water Board's Response to Comments. The Board Chair ruled to exclude the memo from the administrative record. Despite the ruling, the District has attached the memo as Exhibit C as part of its petition. The Central Valley Water Board urges that neither Exhibit C nor the memorandum dated 9 December 2010 (of which Exhibit C is a part) be admitted as part of the administrative record.

The District presented the memorandum to Mr. Coupe at approximately 8:15 on the morning of the hearing and there was simply no time to consider the 12-page memorandum of legal and technical issues prior to the hearing. The District's reason for submitting the memo was apparently to alert staff that there was a purported "lack of response to significant certain comments and evidence submitted by the District." Despite this claim, no effort was made by the District to bring these outstanding concerns to the Central Valley Water Board's attention until the morning of the hearing. In response, the Central Valley Water Board believes that it has adequately responded to all significant comments raised, whether in writing or at the hearing itself.

The Central Valley Water Board considers Exhibit C to be supplemental evidence which should not be admitted as part of the record. If the State Water Board accepts Exhibit C as part of the record, the Central Valley Water Board, in addition to what is in the record and its response, addresses the following specific claims.

In this section, assuming that the memo attached to Exhibit C is admitted as part of the record, although the Central Valley Water Board believes that it has sufficiently responded to all significant comments, the Central Valley Water Board responds to certain specific claims or evidence in Exhibit C as noted below. The SRCSD's comments are included in **BOLD** followed by the Central Valley Water Board response.

1. SRCSD Comments, page 11:

Dr. Gerba concludes that *giardia* is 100 percent inactivated by the SRWTP.

See Central Valley Water Board's response to SRCSD's petition, Section V. C. 4.

2. SRCSD Comments, pages 13-15.

Requiring full tertiary treatment at the SWTP would act as a substantial economic disincentive to the development and use of recycled water by the District and would hinder rather than facilitate the development of recycled water in the Sacramento region.

Title 22 (or equivalent) disinfection is needed to protect the beneficial uses of the receiving water, as described in the Adopted Permit. Wastewater reclamation has not been a priority at the District. Currently less than 1% is recycled.¹¹ Reclamation opportunities are limited since the District is not a water purveyor and must depend on the Sacramento County Water Agency. The District's capitol budget for the last couple of years shows the most significant outlay to be for offices comprising \$80 million out of \$97 million.¹² The District seeks federal and state funding to assist in its recycling infrastructure, thus the idea that construction of full tertiary is a disincentive is disingenuous.

3. SRCSD Comment, pages 29-30.

***Microcystis* is not associated with ammonium.**

See Central Valley Water Board's response to SRCSD's petition, Section VI.B.1.c.i.(c).

4. SRCSD Comments, page 37.

Ambient concentrations of total ammonia in the Sacramento River essentially never exceed the lowest acute thresholds (LC10) thus far reported for *E. affinis* for representative pH conditions.

Although the acute tests for *Eurytemora affinis* and *Pseudodiaptomus forbesi* conducted by Dr. Swee Teh are mentioned in Attachment J of the Adopted Permit (see pg. J-1), these study results were not a factor in the determination of the ammonia effluent limitations. Dr. Teh's chronic toxicity studies for *P. forbesi*, however, were a factor in the determination of the limits. As reported in Appendix J of the Adopted Permit, the results demonstrated that *P. forbesi* reproduction and/or nauplii (a juvenile life stage for copepods) survival was negatively affected by ammonia concentrations as low as 0.36 mg N/L. Ammonia concentrations greater than this are routinely measured for up to 30 miles downstream of the SRWTP while concentrations in the Sacramento River above the SRWTP are an order of magnitude lower (See Central Valley Water Board's response to SRCSD's petition, Section VI.B.2).

5. SRCSD Comments, page 41.

The adopted permit does not provide evidence or explanation as to why reduction in wet season ammonia is necessary to ensure compliance with the dissolved oxygen Basin Plan objective.

The ammonia limit is based on the 1999 USEPA Water Quality Criteria for Ammonia without a mixing zone and not the dissolved oxygen water quality objective. See Staff Response to Comments – SRCSD Comment #51.

¹¹ SRCSD State of the District Report, 2009. Page 7-Recycles 318 million gallons out of 51,000 millions discharged (141 mgd x 365days) = less than 1%

¹² SRCSD Budget 2009-2010

6. SRCSD Comments, pages 42-43.

The Discharger contends assimilative capacity for oxygen demanding substances for other dischargers within the watershed is available.

At a minimum, the dissolved oxygen water objective between Hood and Rio Vista on the Sacramento River is exceeded.^{13,14} These exceedances are due to the 14 tons of ammonia discharged by the SRWTP. All treated wastewater has some degree of oxygen demanding substances. Many of the communities cited in the Discharger's comment use BPTC to substantially reduce those oxygen-demanding substances. However, any increase in oxygen-demanding substances will exacerbate the existing exceedances of the dissolved oxygen water quality objective. The contention that "It is inconceivable that a hypothetical 2% of the SRWTP effluent in a volume of water at some location in the Delta would exert such a demand on dissolved oxygen that there would be no assimilative capacity in the receiving water for additional oxygen demanding substances contributed by another discharger" has been proven wrong by the Low Dissolved Oxygen Prevention Assessment (LDOPA)¹⁵ and the databases¹⁶ on water quality in the Sacramento River.

7. SRCSD Comments, pages 47-49

The N-nitrosodimethylamine (NDMA) limit should be based on the allowance of a human health mixing zone.

Based on the available ambient NDMA data, allowing a dilution credit for NDMA would be a violation of the State Water Board's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (referred to as the State Implementation Plan, or SIP) SIP. The SIP requires the maximum ambient background concentration to be less than the applicable water quality criteria for a specific constituent in order to receive a dilution credit¹⁷ (i.e., there must be assimilative capacity). In this case, the maximum ambient background concentration is non-detect at a lowest-method detection level of 0.01 µg/L. Step 2 of Section 1.4.3.2 of the SIP requires that if all water quality samples are below the reported detection limits, the ambient background concentration shall be set equal to the lowest of the individual reported detection limits. The California Toxics Rule (CTR) human health water quality criterion for NDMA is 0.00069 µg/L. Thus, the ambient background concentration of NDMA is greater than the CTR human health water quality criterion, and dilution credits cannot be allowed.

¹³ Copy of DO_Memo_Appendix_C_Data (SRCSD_DATA_024)

¹⁴ Email from Mike Dempsey, DWR to Rich Breuer and Sal Batmanghlich, DWR dated 17 February 2010. (SRCSD_CORR_2071) (SRCSD_OTHER_122B)

¹⁵ May 2010 - LDOPA

¹⁶ Copy of DO_Memo_Appendix_C_Data (SRCSD_DATA_024)

¹⁶ Email from Mike Dempsey, DWR to Rich Breuer and Sal Batmanghlich, DWR dated 17 February 2010. (SRCSD_CORR_2071)

¹⁷ SIP, Step 2 of 1.4 Calculation of Effluent Limitations

8. SRCSD Comments, page 59.

To the Extent the Regional Board Applies Resolution No. 68-16 to Existing Discharges, Such Application has Not Been Approved Under the Administrative Procedures Act.

The Discharger claims that the application of State Water Board Resolution 68-16 in this case is unlawful because the anti-degradation policy has not been adopted to require analysis for an existing discharge and that application for such a purpose would require compliance with the Administrative Procedures Act.

This claim is misplaced. An anti-degradation finding must be made when issuing, reissuing, amending or revising an NPDES permit. The Central Valley Water Board made a decision that such findings were needed, in part, because the discharge has continued to lower baseline water quality based on new information and science concerning impacts to the Sacramento River and the Delta.

If one were to adopt the Discharger's logic, as long as a discharge could be characterized as "existing", there would never have to be any subsequent anti-degradation analysis or findings performed in a subsequent permit reissuance or renewal, whether it was for the next five years, or the next fifty years, and regardless of what new information or science is available to better understand the impacts of the discharge to waters of the state. This simply makes no sense.

9. SRCSD Comments, pages 72-74.

Bullet Points Are Not a BPTC Analysis

See Central Valley Water Board's response to SRCSD's petition, Section VII. D. 2.

10. SRCSD Comments, page 74.

The District strongly objects to Table F-18 (This is Table F-17 in the Adopted Permit).

See Response to Comments SRCSD Comment #40.

11. SRCSD Comments, pages 94.

The Discharger requests the acute ammonia criterion be based on an effluent pH of 8.0 instead of 8.5 since the effluent pH since 2000 has not exceeded 7.3. Furthermore, effluent pH and temperature should be used to calculate seasonal chronic criteria.

The instantaneous maximum effluent pH limit was changed from 8.5 to 8.0, based on the Discharger's comments and the ammonia acute criterion was calculated based on a pH of 8.0. This did not change the ammonia effluent limitations, however, due to the fact that the limits were based on the chronic ammonia criterion,

not the acute criterion. The Discharger requested that effluent pH and temperature should be used to calculate the ammonia chronic criteria, because end-of-pipe limits are required. When establishing the chronic ammonia criteria in NPDES permits, Central Valley Water Board staff evaluate the effluent and receiving water separately and select the lower or more stringent criteria in order to protect the beneficial uses of the receiving water. In this case, the chronic criteria based on the receiving water pH and temperature result in more stringent criteria and were used to establish the effluent limits.

12. SRCSD Comments, pages 115-116.

The Discharger contends the requirement for a study to develop an analytical method for *Hyaella azteca* is not appropriate and exceeds the Regional Board's authority.

Many of the Discharger's concerns were addressed in the Response to Comments, See Response to SRCSD Comment #67 and at the Board Hearing, Transcript pages 322-326 & 427-438. Additionally, the Discharger's contention that the hyalella analytical method is not promulgated is not accurate. *H. Azteca* is listed as a supplemental species in the Methods for measuring the Acute Toxicity of Effluents and receiving Waters to Freshwater and Marine Organisms, Fifth Edition, EPA-821-R-02-012, October 2002, Appendix B, page 238.

13. SRCSD Comments, page 139

The Discharger requested the monitoring requirement for municipal water be removed.

See Response to Comments, SRCSD Comment #77.

14. SRCSD Comments, page 142.

Remove the footnote 2, there is no link and it is a fragment.

This typo was corrected in the final version of the Adopted Permit.

15. SRCSD Comments, page 146.

Typo - 2L/year should read 2L/day.

This was a typo in one of the tentative permitting options, not the tentative permit that was adopted.

16. SRCSD Comments, page 146.

Discharger is providing additional comments and evidence.

This additional information was considered by the Central Valley Water Board. The evidence provided were not additional comments on the issues, so specific responses were not required.

B. Support for the Request

Please see Section III.A, above.

IV. COST CONSIDERATIONS

Costs to comply with the Adopted Permit and the socioeconomic analyses were considered by the Central Valley Water Board. The Board's California Water Code section 13241 findings in the Adopted Permit are supportable and the permit properly considers each of the factors required in the Water Code. Water Code section 13263, subdivision (a) states in pertinent part that the waste discharge requirements shall take into consideration the provisions of Section 13241. The provisions noted in Water Code section 13241 are: (1) past, present, and probable future beneficial uses of water; (2) environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto; (3) water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area; (4) economic considerations; (5) the need to develop housing within the region; and (6) the need to develop and use recycled water.

Despite the fact that the Central Valley Water Board has made section 13241 findings, the Central Valley Water Board notes that if numeric effluent limits are "more stringent" than required under federal law, the Central Valley Water Board may take into account the economic effects of doing so. (*City of Burbank v. State Water Resources Control Board* (2005) 35 Cal.4th 613, 625.) The Central Valley Water Board also notes that because the Adopted Permit does not establish water quality objectives, but merely implements existing water quality objectives from its Basin Plan, no consideration of the Water Code section 13241 factors is mandated. (See, e.g., *San Joaquin River Exchange Contractors Water Authority v. State Water Resources Control Board* (2010) 183 Cal.App.4th 1110, 1120.)

Here, in caution, the Central Valley Water Board has considered economics including the costs to comply with the Adopted Permit and associated economic costs as provided in the Discharger's anti-degradation analysis, the Building Industry Association (BIA) study¹⁸, the study submitted by the Water Agencies^{19 20}, and the University of Pacific (UOP) study.²¹ As noted elsewhere, the Title 22, or equivalent, disinfection requirements are not more stringent than requirements necessary for any discharge from treatment facilities needing

¹⁸ Building Industry Association: Comments on the Tentative Waste Discharge Requirements and Time Schedule Order for SRWTP SRCSD_OTHER_192)

¹⁹ The Water Agencies include the following agencies; Alameda County Water District, Alameda County Flood Control and Water Conservation District, Zone 7, Contra Costa Water District, Kern County Water Agency, Metropolitan Water District of Southern California, San Luis & Delta Mendota Water Authority, Santa Clara Valley Water District, State & Federal Contractors Water Agency, State Water Contractors, and Westlands Water District

²⁰ Report by Trussel et al: Ammonia Removal Cost Alternative for the SRWTP (SRCSD_OTHER_346); R. Shane Trussel: Ammonia Removal Cost Alternatives for SRWTP. (SRCSD_OTHER_181); R. Shane Trussel: Summary of Preliminary Findings in the response to the Tentative NPDES Permit, (SRCSD_OTHER_191)

²¹ Larry Walker associates: Technical Memo, Approach to Water Quality-Based Effluent Limits Based on Performance Record (SRCSD_OTHER_187)

to meet tertiary-level treatment for protection of beneficial uses of the receiving waters. The Central Valley Water Board requires similar tertiary-level treatment for all other relatively-large wastewater treatment plants that discharge into the Delta (Cities of Lodi, Manteca, Stockton, and Tracy) for removal pathogens to protect public health.

The Section 13241 socioeconomic analysis conducted for the Adopted Permit is based on those costs to meet requirements more stringent than federal technology requirements for secondary treatment. Thus, the costs to meet Title 22, or equivalent, disinfection requirements are included in the analysis. The Discharger, BIA, UOP, and the Water Agencies all submitted different versions of socioeconomic analyses that were part of the Central Valley Water Board's consideration. The Discharger's analysis is based on the construction of nitrification/denitrification, ultraviolet light disinfection, and tertiary filtration for 218 mgd. This is not the appropriate costs for a 13241 analysis because the Discharger withdrew its proposal for expansion of its Facility in June 2010. The 13241 analysis is for treatment more stringent than requirements to implement water quality objectives. In this case, only the costs for tertiary-level filtration are to be evaluated. Similarly, the BIA analysis included the Discharger's estimated costs for nitrification/denitrification and filtration. The UOP analysis evaluated only nitrification/denitrification costs that are not required in a 13241 analysis. The Water Agencies also included all treatment costs in its analysis and concluded lower estimated construction costs. If the construction costs for tertiary level treatment vary, so will the socioeconomic analysis. The table below shows the dramatic differences in the costs for tertiary treatment (in this case for this facility being microfiltration technology) that the Central Valley Water Board considered.

Tertiary Filtration Cost Estimates
(to meet Title 22, or equivalent, disinfection requirements)

SRCSD Carollo	Water Agencies Trussell ²	CVRWQCB Staff PG Environmental ³
Microfiltration \$4,390,000 UV Disinfection \$450,000 \$4,840,000/mgd	Microfiltration + Ozone \$2,120,000/mgd	Mixed Media Filtration \$3,300,000/mgd

¹ Carollo Engineers-Clarification of base construction costs & construction cost factors - Dated 25 August 2010 (SRCSD_CORR_0716)

² Trussell Technologies Inc - 1 October 2010 letter to Adam Kear, MWDC from R. Shane Trussell (SRCSD_OTHER_191)

³ PG Environmental Memorandum to Kathleen Harder from PG Environmental, LLC dated 18 August 2010 (SRCSD_CORR_0699)

Note: The Discharger and PG Environmental used a peaking factor of 1.43 based on Discharger influent flows from 1994 - 2002; Trussell used the peaking factor from Carollo Engineers Capacity Rating Report of 1.33 based on data from 1994 - 2004.

The Discharger's estimates for compliance with the Adopted Permit are identified under the first column, labeled SRCSD Carollo. The Water Agencies' estimated costs are by Trussell Technologies, and PG Environmental estimated costs were requested by Central Valley Water Board staff. Given the large range in tertiary treatment costs by the Discharger

(Carollo 1st column) and the other cost estimates, Central Valley Water Board staff questioned the Discharger's higher estimated costs for the following reasons.²²

- The filtration costs for other independent estimates from the Discharger conclude lower and relatively similar costs to the Trussell and PG Environmental estimates, as shown in the table below:

SRCSD Treatment Feasibility ¹	SRCSD Pilot Study ²	SRCSD 2007 Budget ³	Mercury Removal Treatment Feasibility Study ⁴
\$2,100,000/mgd	\$1,400,000/mgd	\$1,400,000/mgd	\$1,900,000/mgd

¹ Carollo Engineers - NPDES Permit No. CA 0077682-Provision E.6-Treatment Feasibility Studies. (SRCSD_OTHER_056E)

² SRCSD Membrane Pilot Testing-Presentation before Central Valley Clean Water Association -2007 (SRCSD_OTHER_260)

³ SRCSD 2006-07 Final Budget (SRCSD_OTHER_265; page 19)

⁴ Mercury Offset Feasibility Workshop No. 2- 12/10/2002 - Fact Sheet - Treatment Feasibility Study Information (SRCSD_OTHER_396)

- The Discharger's estimates of \$1,400,000 for a pilot microfiltration project, as presented in the Discharger-Membrane Pilot Testing Presentation before Central Valley Clean Water Association in 2007 were not used in the Discharger's estimate. Instead, the Discharger used a cost of \$4,390,000 for microfiltration costs which is relatively high compared to other estimates as well as its own estimate.
- The Discharger included cost for ultra violet light disinfection in its estimate. The tentative permit, and the now Adopted Permit, did not include discharge limitations or requirements requiring the replacement of the existing use of chlorination disinfection with ultraviolet light disinfection. Therefore, the Discharger's estimate did not reflect the cost of the additional requirements placed by the Central Valley Water Board.
- The Discharger used the City of Davis' wastewater treatment plant filtration preliminary design cost estimate as a basis of its cost estimate. The tertiary costs for the Davis Wastewater Treatment Plant are not an appropriate equivalent because Davis does not use similar wastewater treatment technologies as the Discharger facility. In fact, there is not a more dissimilar facility to use to estimate costs for the Discharger, because the City of Davis treatment facility uses a land-based treatment system (lagoons and overland treatment), while the Discharger uses pure oxygen activated sludge. The two

²² The District makes additional, unsuccessful efforts to shore up its claims about the purported costs of compliance. It is true that the Adopted Permit did not make any specific findings related to what the costs would be exactly. But aside from the wide swath of estimates from various entities, such cost estimates are preliminary. (Transcript at pp. 143, 147.) Consequently, until more work is done towards making concrete additions and upgrades to the SRWTP, making any definitive finding as to a specific amount concerning the purported costs of compliance would be inappropriate. (SRCSD_BM_13)

treatment systems are very different, therefore the basis of the Discharger's estimate is questionable.²³

Furthermore, the total upgrade costs proposed by the Discharger were based on a high peaking factor using old flow data (data from 1994-2002). The estimate provided no explanation for why more recent data was not used to determine the peaking factor, or why at minimum they did not use the same peaking factor used in the Carollo capacity rating study²⁴, which was based on effluent data from 1994-2004 (the Carollo peaking factor was 7% lower than the peaking factor based on data from 1994-2002). Using a higher peaking factor increases the cost estimate. Central Valley Water Board staff asked the Discharger why a different peaking factor was used in the cost estimate. The Discharger's explanation did not address the question, it just stated the difference is within planning estimates.²⁵ A more accurate peaking factor would be based on the most recent flow data 2005- 2010 because the peaking factor has lowered in recent years presumably due to aggressive inflow and infiltration corrections completed by the Discharger.

The socioeconomic analysis conducted by the Discharger did not include other socioeconomic costs to downstream users, such as the Water Agencies representing drinking water and agricultural uses, the commercial and recreational fishermen, or other recreational users. UOP in its analysis included costs to farmers and commercial fishermen for loss of income and jobs due to Delta pumping restrictions to protect endangered species. The estimated loss of agricultural and salmon fishery jobs and income was an estimated 3800 jobs and \$270 million in income. Although, the SRWTP discharge has not been directly linked as the only cause of the decline of fisheries and aquatic life in the Delta, the Central Valley Water Board found that it is a stressor and a likely contributor to the decline, and such costs should be considered, at minimum, for antidegradation purposes.

Each economic analysis performed by differing parties arrived to different conclusions. The Discharger's analysis only evaluated an incremental increase in water quality for the increase from 181 mgd to 218 mgd, and found it does not merit the substantial treatment costs. However, this analysis is moot, since the Discharger is not expanding its plant. Regardless, the analysis did not appropriately compare the water quality increases to the advance treatment for the entire treatment plant capacity. Since the Adopted Permit requires tertiary level treatment for the permitted 181 mgd discharge, the comparison should be the difference between the existing secondary treated effluent quality at 181 mgd versus tertiary treated effluent at 181 mgd flow

The Building Industry Association (BIA) analysis paints a dire economic scenario for housing and commercial costs due to significantly increased connection fees. The Discharger's connection fees would be the highest in the State based on the 2007-2008

²³ The Central Valley Water Board is also skeptical of the District's cost estimate because it still remains unanswered why the economy of scale for the District's large facility is not providing a lower cost, as to both the current rates for secondary treatment and the District's proposed rates for advanced treatment. (Transcript at pp. 149-150.) (SRCSD_BM_13)

²⁴ Carollo Engineers, "Sacramento Regional Wastewater Treatment Plant Capacity Rating Study" February 2005. (SRCSD_OTHER_051)

²⁵ Email from Vyomini Pandya to Kathy Harder dated 10 August 2010. (SRCSD_CORR_0684)

wastewater user fees.²⁶ However, numerous surrounding communities have upgraded and expanded their treatment facilities and in some cases built completely new facilities without similar substantial increases in connection fees.²⁷ In the case of the District, the wastewater treatment plant was funded by the Clean Water Grant program that paid for nearly 90% of the existing treatment facility.²⁸ Lastly, the sewer fees for the communities served by the regional facility have been among the lowest fees for many years.²⁹ When a sanitation district does not increase its fees for many years, then the actual fee increase to address cost of a renewed permit results is a substantial increase from the existing fee rate.

The Water Agencies submitted a socioeconomic analysis based on USEPA's March 1995 Interim Economic Guidance for Water Quality Standards Workbook. A two part test showed the cost for nitrification/denitrification and filtration is within the lower to middle of the range of fee rates for surrounding communities and therefore considered affordable for the Sacramento area.³⁰

Central Valley Water Board staff reviewed the relative per capita costs of upgrades by other communities compared to Discharger's cost estimate. Such cost comparisons are not exact because not all upgrade projects are equivalent, but the comparison showed that Discharger's estimate was in the mid-range of per capita costs, and that these other communities that have completed the plant upgrades and are operating the upgraded systems without any substantial economic harm. In fact, no evidence exists in the record that these other communities suffered any economic harm as a result of an increase in rates. Even if the \$2 billion costs projected by the Discharger are correct, the increased sewage treatment rate to \$60 per month for each household is not out of line for sewer bills. Many communities discharging to surface waters pay this amount or substantially more for sewer service. For example, households in the Placer County Sanitation District (Auburn Folsom Lake Service Area) pay approximately \$100 per month for sewage treatment and households in the Placer County Sanitation District (North Auburn Service Area) pay \$67 per month for sewage treatment.³¹ Residents in Cascade Shores, a remote community in Nevada County that serves about 84 households, pay \$166.25 per month to cover the costs of their NPDES discharge that is treated through a newly constructed advanced treatment facility to meet requirements similar to those adopted for the Discharger. On the other hand, larger communities in the Sacramento/Delta area that have already upgraded treatment facilities to advanced treatment and tertiary treatment similar to that required in the Adopted Permit have sewer fees substantially less than the monthly fees projected by the Discharger, including Stockton (\$22.75/month), Roseville (\$27.90/month), Tracy (\$31.00/month), and Lodi (\$38.84/month).³² The Central Valley

²⁶ State Water Resources Control Board, http://www.waterboards.ca.gov/publications_forms/publications/general/docs/wastewatersurvey0708.pdf (SRCSD_OTHER_325)

²⁷ See Transcript at p. 151 noting that the Central Valley Water Board does not understand the "unusually high projected fees" as they "have not seen such high connection fees for a wastewater treatment facility in the Central Valley Region." (SRCSD_BM_13)

²⁸ Discharger History, (SRCSD_OTHER_046F)

²⁹ Cities of Stockton, Lodi, Tracy, Roseville and Placer County Sewer fees (SRCSD_OTHER_318-322)

³⁰ Water Agencies Comment letter dated 8 October 2010, pages 89-97. (SRCSD_CORR_0995)

³¹ Placer County sewer fees, (SRCSD_OTHER_321)

³² Cities of Stockton, Lodi, Tracy, Roseville and Placer County Sewer fees (SRCSD_OTHER_318-322)

Water Board does not believe since other communities pay greater monthly fees, the Discharger should also pay higher fees. But this information does demonstrate that the increased user rates estimated by the Discharger are not exorbitantly high, as they claim. The rates are consistent with other communities throughout the Central Valley Region and are reasonable considering the water quality benefits associated with the improvements.

After considering all the socioeconomic and cost data submitted by several parties, the Central Valley Water Board found that these requirements are necessary to protect the beneficial uses of Sacramento River and Sacramento-San Joaquin Delta, including water contact recreation and irrigation uses, as well as the indirect benefit the improved water quality resulting from a tertiary treated effluent will have in protecting and enhancing aquatic life beneficial uses.

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

In Section V, the Discharger contends that the application of the Department of Public Health (DPH) reclamation criteria³³ to reduce pathogens (i.e., Title 22, or equivalent, disinfection requirements), are not justified. The Adopted Permit includes the rationale for implementing the Title 22 reclamation requirements for the surface water discharge (see Fact Sheet pages F-72 to F-80). Title 22, or equivalent, disinfection must be implemented to protect the Sacramento River and the Delta beneficial uses for contact recreation, agricultural irrigation and municipal and domestic water supply. The site-specific analysis of increased public health risk, the implementation of Best Practicable Treatment or Control (BPTC), the recommendation by DPH, the concurrence by the USEPA, and the fact that the discharge is a controllable source of pathogens where the technology is feasible, reasonable and already in use by many Central Valley dischargers, dictate the discharge be a pathogen-free wastewater.

The beneficial uses of the Sacramento-San Joaquin Delta include municipal and domestic supply, water contact recreation, and agricultural irrigation supply. To protect these beneficial uses, the Central Valley Water Board finds that the wastewater must be disinfected and adequately treated to prevent disease. Wastewater must be treated to a level equivalent to the Title 22 reclamation criteria.

Pathogens include bacterium, viruses and protozoans, which exist in natural waters and wastewater. Pathogens are difficult to detect, because of the typically low abundance in most waters. Therefore, indicator bacteria (e.g., total coliform organisms) are used as a barometer of pathogen water quality. NPDES permits include total coliform organism limitations to measure the effectiveness of disinfection processes. Specific protozoans of concern for the Central Valley Drinking Water Group are *Giardia* and *Cryptosporidium* from human and animal fecal waste. Both protozoans are in municipal wastewater and can cause diarrhea, vomiting and cramps. For immune suppressed individuals, the illness can be very serious, including death.

³³ DPH reclamation requirements are contained in California Code of Regulations, Title 22, division 4, chapter 3

The Sacramento River near the diffuser is a popular sport fishing area.³⁴ In addition, there are at least 20 agricultural diversions within 1 mile upstream and 2 miles downstream of the discharge.³⁵ Based upon information submitted by Discharger, the typical construction of the agricultural irrigation water intakes in the vicinity of the outfall would draw water from near the bank of the river, below the water surface (deep enough to not go dry during low river levels, but far enough from the river bottom to not be impacted by bottom sediments).³⁶ It appears that undiluted effluent will not be drawn into the agricultural intakes, but varying mixtures of effluent and river water will be diverted from the partially mixed discharge plume. The nearest drinking water intake is approximately one mile upstream at the new Freeport water intake. River flow modeling conducted by Discharger concluded that the SRWTP discharge will not be carried far enough upriver during incoming tides to be captured by the Freeport intake, however an operating agreement between the East Bay Municipal Utility District and Discharger will prevent diversion of river water possibly containing diluted treated wastewater at the Freeport water intake.

There is on average at least 20:1 dilution of the discharge in the Sacramento River. Based on general recommendations by DPH, this level of dilution typically does not require tertiary filtration.³⁷ However, due to site-specific circumstances of the discharge to the Delta being a major drinking water supply and a high occurrence of direct public contact at point of discharge and downstream³⁸, Central Valley Water Board staff acquired a site-specific recommendation of DPH regarding the appropriate level of treatment needed to protect the beneficial uses of the receiving water.³⁹ DPH recommended that the Discharger conduct a health risk assessment study for its discharge. The Discharger contracted with Dr. Charles Gerba from the University of Arizona to conduct a health risk assessment. The Study concluded that there is an increase in *Cryptosporidium* and *Giardia* concentrations as a result of the wastewater discharge, with (using conservative conditions) an increased risk of infection of downstream water recreationists from *Cryptosporidium* and *Giardia* of 3.2 to 7.4⁴⁰ times based on the lower and upper 95 percentile limit. After reviewing the Discharger's health risk assessment study, in its 15 June 2010 letter, DPH recommended the Discharger provide additional treatment sufficient to reduce the additional risk of infection posed by exposure to the discharge, and that the pathogen concentrations be reduced until the level of health risk is no more than 1 infection per 10,000 exposures to the river water. Based on the results of the study, the combined (*Cryptosporidium* and *Giardia*) risk of infection of the 20:1 diluted effluent is 10.4:10,000, which is substantially greater than DPH's recommended 1:10,000.

³⁴ "Localized Mercury Bioaccumulation Study", Larry Walker Associates, March 2008, Figure ES-1. (SRCSD_OTHER_093)

³⁵ NPDES Permit Renewal Issues – Drinking Water Supply and Public Health, SRWTP, 14 December 2009, CVRWQCB (SRCSD_OTHER_323)

³⁶ SRCSD Comments on the Tentative Permit (SRCSD_CORR_1002 page 8).

³⁷ Letter from Department of Health Services to Executive Officer regarding Recommendations for Waste Discharge Requirements with attached "Modeling the Impact of Body-Contact Recreation on Pathogen Concentrations in a Source Drinking Water Reservoir" (SRCSD_CORR_0140)

³⁸ "Localized Mercury Bioaccumulation Study", Larry Walker Associates, March 2008, Figure ES-1. (SRCSD_OTHER_093 page viii – Figure ES-1)

³⁹ 11 May 2009 letter to Mr. Carl Lischeski, Environmental Management Branch, DPH (SRCSD_CORR_049)

⁴⁰ "Estimated Risk of Illness from Swimming in the Sacramento River", Dr. Charles Gerba, Table 5, February 2010. Table 5 lists the 95% risk of illness for both *giardia* and *cryptosporidium* with 10 exposures. There is a 1.6 to 3.7 increase risk of illness from Freeport above the discharge compared to River Mile 44 downstream. The increase for infection is twice those numbers (Appendix 4, #3). (SRCSD_OTHER_148)

As shown in the table below, the health risk estimated by the Discharger exceeds DPH's recommendation downstream of the discharge and in the 20:1 diluted effluent. Consequently, the existing secondary disinfection system is not adequate and the Adopted Permit requires treatment plant upgrades to produce a pathogen-free wastewater.

Single Swimming Exposure – Sacramento River Upstream and Downstream of Discharge				
Location	Risk of Illness (E-04)		Risk of Infection (E-04)	
	Average	95 th Percentile	Average	95 th Percentile
8 miles upstream	1.3	1.5	2.6	3.0
100 feet upstream	1.2	1.4	2.4	2.8
0.5 miles downstream	1.8	2.1	3.6	4.2
1.5 miles downstream	3.4	5.2	6.8	10.4
20:1 diluted effluent	5.2	6.3	10.4	12.6

The State Water Board's Antidegradation Policy (Resolution 68-16) is an additional factor considered when the Central Valley Water Board made the determination that Title 22, or equivalent, disinfection was required. The existing permitted discharge is degrading the receiving water (as indicated by the increase in the risk of illness and infection from upstream to downstream of the discharge). Therefore, the Discharger must use BPTC in accordance with State Water Board Resolution 68-16. The Sacramento River and Sacramento-San Joaquin Delta are high quality waters of exceptional recreational, economical, and ecological significance to the people of the State of California. As discussed below, the Central Valley Water Board found that in order to maintain and enhance the water quality of the Sacramento River and Sacramento-San Joaquin Delta, the Discharger must implement BPTC. BPTC for this facility includes implementation of the equivalent of Title 22 filtration with ultraviolet light, ozone or chlorine disinfection treatment (see Section V.E.).

The USEPA in its response to the tentative Permit clearly indicated that any treatment less than tertiary filtration would not meet water quality standards as described in its discussion of the alternative disinfection option.

"We strongly object to the disinfection alternative. The disinfection alternative removes the Title 22 tertiary filtration requirements and imposes secondary treatment effluent limitations for BOD, TSS, and less stringent total coliform limits. The Regional Board must require the Discharger to provide tertiary filtration, which is necessary for the protection of beneficial uses, specifically municipal and domestic water supply (MUN). Without this requirement, the permit will not meet water quality standards."⁴¹

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

The Discharger contends the Central Valley Water Board did not conduct a reasonable potential analysis for pathogens or identify the applicable water quality objective.

⁴¹ USEPA letter to Pamela Creedon from Alexis Strauss dated 7 October 2010. (SRCSD_CORR_0942)

Pathogens exist in domestic wastewater. If not properly treated, these pathogens are harmful to humans, therefore the discharge has reasonable potential to cause or contribute to an exceedance of the Basin Plan's narrative toxicity objective.⁴² A traditional reasonable potential analysis where effluent concentrations are compared to the water quality objective is not applicable for pathogens.

The Discharger incorrectly identifies the water quality objective as the Basin Plan water quality objective for pathogens based on the U.S. EPA Beach standard as follows:

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

This Basin Plan water quality objective for pathogens is applied to ambient water. This water quality objective is not sufficient to protect the public from a domestic wastewater discharge, because wastewater contains human waste and pathogens which are able to be transferred to other humans. Ambient water includes pathogens from animal and other non-human sources that mostly are not transferrable to humans. Total coliform organisms are used as indicator parameters for proper disinfection of domestic wastewater discharges. Pathogens include bacteria, viruses and protozoans. To ensure all bacteria, viruses, and protozoans are adequately removed from domestic wastewater, a much lower count for total coliform organisms is required. The Central Valley Water Board seeks recommendations from DPH on the proper level of disinfection to protect humans that may come into contact with the treated wastewater, which for this specific discharge is Title 22, or equivalent, disinfection.

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

The Central Valley Water Board generally follows a November 1980⁴³ general recommendation by DPH on the appropriate levels of disinfection for protection of body-contact recreation in waters downstream of a sewage treatment plant discharge. The general DPH recommendation allows a discharge of secondary treatment with chlorination when there is a minimum of 20-to-1 dilution (river flow to discharge flow), and suggests tertiary filtration when less than 20-to-1 dilution is available. The DPH recommendations are a "rule of thumb" and are not regulation. Site-specific disinfection recommendations are often sought from DPH in preparing NPDES permits. Whether using a site-specific recommendation or the general recommendation from DPH, the Central Valley Water Board must make its own determination of the level of disinfection. The Central Valley Water Board has adopted permits that are both more and less

⁴² Basin Plan's narrative toxicity objective states, in part, that, "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life..."

⁴³ The original recommendation from DPH (formerly the Department of Health Services) was in 1980, however, the recommendation has been reiterated in more recent correspondence from DPH (e.g., 1 July 2003 letter to Thomas R. Pinkos, Executive Officer, CVRWQCB, from David Spath, Chief, Division of Drinking Water and Environmental Management, Department of Health Services). (SRCSD_CORR_0140) and SRCSD_OTHER_391)

stringent than the general 20-to-1 rule of thumb. The following are recent Board-adopted NPDES permits in which tertiary filtration and the associated total coliform effluent limitations are required although 20-to-1 dilution is available:

- City of Jackson Wastewater Treatment Plant (WWTP) (Order R5-2007-0133)
- Ironhouse Sanitary District WWTP (Order R5-2008-0057)
- City of Angels WWTP (Order R5-2007-0031 and R5-2009-0074)

Following site-specific studies and site-specific recommendations from DPH, the NPDES permit for the City of Vacaville Easterly Wastewater Treatment Plant (Order R5-2008-0055-01) seasonally allows secondary treatment with chlorination discharge with essentially no dilution.

Even when the 20-to-1 "rule of thumb" is followed by the Central Valley Water Board, the available dilution often far exceeds a 20-to-1 river to discharge flow ratio.⁴⁴ The dilution ratio for the District's discharge is typically greater than 20-to-1, but can be at times less than 20:1.⁴⁵ The following is a list of all municipal sewage treatment plant discharges to the Sacramento River downstream of Shasta Dam and the associated average dilution ratios (river-to-effluent). As noted, some of these treatment facilities have a tertiary filtration process preceding the disinfection process, which reduces the pathogen concentrations, although the filtration systems themselves are not designed and operated to produce a pathogen-free effluent (i.e. Title 22, or equivalent, filtration system).

<u>Facility</u>	<u>Permitted Flow</u>	<u>Average Dilution⁴⁶</u>
Sacramento Regional CSD WWTP (no filtration)	181 mgd	50-to-1
City of Redding Stillwater WWTP (filtered)	4 mgd	1200-to-1
City of Redding Clear Creek WWTP (filtered)	8.8 mgd	600-to-1
City of Corning WWTP (no filtration)	1.4 mgd	4100-to-1
City of Anderson WWTP (filtered)	1.4 mgd	2400-to-1
City of Rio Vista Beach WWTP (no filtration)	0.65 mgd	1000-to-1
City of Chico WWTP (no filtration)	12 mgd	400-to-1
City of Red Bluff WWTP (filtered)	2.5 mgd	2600-to-1

Due to site-specific circumstances of the discharge to the Delta being a major drinking water supply and a high occurrence of direct public contact at point of discharge and downstream, Central Valley Water Board staff sought a site-specific recommendation of DPH rather than rely on the general recommendation from 1980. The Discharger

⁴⁴ See also Transcript at p. 99 noting that the application of 20:1 dilution is a "rule of thumb" and is considered on a site-specific determination and evaluated on a discharge permit by discharge permit situation. (SRCSD_BM_13)

⁴⁵ The Sacramento River is tidal and during incoming tides the dilution ratio can be less than 20:1. The Adopted Permit includes a prohibition that the flow ratio not be less than 14:1. (SRCSD_CORR_3000)

⁴⁶ SRCSD tends to cite the dilution granted in an NPDES Permit for calculation of effluent limits as representative of the dilution available for a discharge. However, the dilution granted in a permit is often much less than is available in the receiving water, because we generally do not grant more dilution (that is, give higher effluent concentration limits) than is needed by the discharger to achieve compliance. The Discharger's dilution proposals generally used the entire available assimilative capacity in the river, while most other dischargers use a fraction of available assimilative capacity. This table includes the actual average dilution available, not the dilution allowed in the permits.

seems to ignore the site-specific DPH recommendation and wants its permit to be based on the general recommendation from 1980. Clearly, the site-specific DPH recommendation is more appropriate.

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

1. February 2010 Risk Assessment Report

The Discharger characterizes the Central Valley Water Board request to DPH for health risk assessment guidance as "more akin to an adjunct to the 20:1 policy that ultimately served to confirm the lack of need for filtration." (Discharger Petition footnote #87). This is an inaccurate statement. The Central Valley Water Board would be derelict in its duty to protect beneficial uses not to request DPH guidance for the largest inland wastewater discharger in California that discharges to the largest domestic and agriculture source water in the State. Additionally, as described in the 11 May 2009 letter⁴⁷ to Mr. Carl Lischeski, DPH, Central Valley Water Board staff were concerned with the high degree of direct public contact near the outfall (popular fishing location and 20 or more agricultural diversions), the lack of a chlorine contact chamber, and a high level of coliform associated particles in its secondary effluent that could hinder adequate disinfection. To adequately protect the beneficial uses of the Sacramento River, DPH recommended a standard of 1:10,000 for the risk of infection. Based on the results of the Discharger's health risk assessment, the discharge causes an increase in the risk of infection, which exceeds DPH's recommendation.

Central Valley Water Board staff has not disputed the results of the February 2010 Risk Assessment Report. The report clearly shows a statistically significant increase in risk of illness two miles downstream of the discharge where the discharge is fully mixed with the river. It also shows that the risk of infection exceeds DPH's recommendation. This is discussed in detail above in Section V. A. The Central Valley Water Board concluded that any increase from a controllable source where treatment is an option is not an acceptable risk.

The Discharger also continues to point out the average risk of illness differences between the upstream and downstream locations which appear to be small. However, the comparisons were based on the averages and should be based on the 95th percentile. This comparison shows the range of risk of illness from Freeport Bridge (upstream of the discharge) to River Mile 44 (downstream of the discharge) ranging from 1.5 – 3.7 times greater. Additionally, the DPH requested the statistics for the risk of infection which are much higher than the risk of illness. These numbers were not included in the risk tables, but buried in Appendix 4 of the report and described as two fold increase at the most over the risk of illness. DPH found using its recommended 1:10,000 risk of infection, that Dr. Gerba's estimates were 1:1000 for a single swimming exposure and 1:100 from ten such exposures.⁴⁸

⁴⁷ 11 May 2009 Letter from Central Valley Water Board staff to Dept of Public Health staff regarding Health Risk Assessment for SRCSD Discharge to Sacramento River (SRCSD_CORR_0429)

⁴⁸ Letter from DPH to Ken Landau, June 15, 2010. (SRCSD_CORR_0573)

2. Letter From DPH and Response

In its 15 June 2010 letter, DPH recommends that the Discharger provide additional treatment sufficient to reduce the additional risk of infection posed by exposure to the discharge; and that the pathogen concentrations be reduced until the level of health risk is no more than 1 infection per 10,000 exposures to the river water.⁴⁹ The Discharger argues that the DPH recommendation is overly stringent, and that most natural waters do not meet this level of protection of infection. The Discharger recommends, instead, that the USEPA Beach Standard⁵⁰ for freshwater recreational exposure of 8 illnesses per 1000 exposures, be used as the level of human health protection. The Discharger additionally states that the discharge does not create a health risk greater than the USEPA Beach Standard.

The USEPA Beach Standard is not an appropriate or applicable standard for the discharge of treated sewage, a controllable source of pathogens.⁵¹ DPH states the following regarding the applicability of the beach standard in this case in its 15 June 2010 letter to the Central Valley Water Board:

"The Criteria [Beach Standards] are based on risks posed by ambient recreational waters, where the pathogens detected are from human and animal sources. In the case under consideration, the discharge appears to be contributing at least 30 percent of the pathogens detected in the receiving waters. The human origin of these pathogens renders them more hazardous to swimmers."⁵²

In the Forward of the Beach Standards, the then Director of the USEPA Criteria and Standards Division states: "The bacteriological water quality criteria recommended in this document are based on an estimate of bacterial indicator counts and gastrointestinal illness rates that are currently being accepted, albeit unknowingly, in many circumstances, by the States."⁵³ The Beach Standard of 8 illnesses for 1000 exposures is not a policy of USEPA nor does it state that this is an acceptable rate of illness. It is instead a recognition that there is a health risk associated with recreational use of freshwaters, even when those waters in and of themselves are considered to be free of health risk. Wildlife, non-point source discharges, and the recreationists themselves, all contribute pathogens to the freshwaters used for recreation. If a controllable sewage treatment plant discharge is allowed to add pathogens to a receiving water such that the health risk is at the USEPA Beach Standard, the uncontrollable sources and contribution of pathogens from wildlife, non-point source pollution, and the recreationists, themselves, will cause the overall health risk to exceed the 8 illness per 1000 exposures. If the Beach Standard is applied to the SRWTP discharge, under critical low-flow river conditions, the discharge could cause nearly 1 of every 100 people recreating in the river to

⁴⁹ Letter from DPH to Ken Landau, June 15, 2010. (SRCSD_CORR_0573)

⁵⁰ "Ambient Water Quality Criteria for Bacteria - 1986" EPA 440/5-84-002, January 1986 (SRCSD_OTHER_370)

⁵¹ 15 June 2010 letter from Gary Yamamoto, DPH to Ken Landau, Central Valley Water Board, (SRCSD_CORR_0573)

⁵² Letter from DPH to Ken Landau, June 15, 2010. (SRCSD_CORR_0573)

⁵³ "Ambient Water Quality Criteria for Bacteria - 1986" EPA 440/5-84-002, January 1986 (SRCSD_OTHER_370)

become ill from pathogens, which is in addition to any contribution of health risk from other sources. In response to the Discharger contention that this is a misleading statement, the Central Valley Water Board is not stating that the current health risk from the discharge is 1 illness for every 100 people (the estimated risk for one swimming exposure is 5 illnesses in 10,000 people, on average, for a 20:1 diluted effluent). However, if the Beach Standard was used as the acceptable risk level for permitting a wastewater discharge, it would allow this level of exposure, which is not acceptable.

The health risk study, conducted by Discharger after consultation with DPH, focused on pathogen impacts from body contact recreation. DPH determined recreational contact with the Sacramento River has a higher degree of water contact and risk of illness than the other beneficial uses potentially impacted by pathogens. Therefore, for pathogens, recreational contact is considered the most sensitive of all the uses downstream of the discharge. When developing pathogen removal requirements for the Adopted Permit, staff reasonably presumed that if the District fully complied with the removal requirements to protect the most sensitive use, all other uses would be protected. This approach is typical in the development of permits by staff to avoid a discharger from having to conduct additional studies at considerable costs to evaluate impacts to uses that are not the most sensitive when such studies are not warranted. This was the case for the Adopted Permit. Other beneficial uses that can be impacted by pathogens in the District's discharge include the following:

- Agricultural irrigation (AGR) beneficial use. Some crops, such as strawberries and carrots, can transmit pathogens in the irrigation water to human consumers. Irrigation water intakes in the immediate vicinity of the discharge are not an issue because the irrigation water is drawn from the sides of the river outside of the mixing zone, so those agricultural irrigation diversions contain no wastewater. However, any agricultural diversion more than a mile downstream of the discharge will contain some amount of wastewater and the associated pathogens. For agricultural irrigation with water containing the discharge, there is an increased pathogen loading onto the crops due to the discharge. The Central Valley Water Board did not require a specific study be conducted to quantify this health risk. However, tertiary filtration to remove pathogens will eliminate this increased health risk. It is reasonable to presume that the irrigation water handled by farmers and farmer workers creates another potential exposure pathway to pathogens.
- Drinking Water (MUN) beneficial use. The Sacramento River and Delta downstream of the discharge are used extensively for municipal and domestic drinking water supply. The raw water supply for these drinking water systems contains increased concentrations of pathogens as the result of the existing discharge, although the health risk caused by the increased pathogen concentrations has not been studied. Municipal drinking water intakes that provide full drinking water treatment required by State and Federal regulations should be able to remove the increased pathogens without a health risk to the consumers.

3. Permit Discussion of February Report

The Discharger continues to advocate the use of the Beach Standard (8 illnesses:1000 exposures) as the applicable objective for pathogens. As discussed above in subsection 2, DPH does not recommend the Beach Standard for a controllable source that includes human pathogens. In its 15 June 2010 letter, DPH provides the following reasons the Beach Standard is not adequate for the District's discharge:

"In the case of the SRCSD discharge, the CDPH does not consider conformance with the EPA's Recreational Water Quality Criteria (Criteria) to provide adequate public health protection. This view is based on the following:

- "1. The Criteria [Beach Standards] are based on risks posed by ambient recreational waters, where the pathogens detected are from human and animal sources. In the case under consideration, the discharge appears to be contributing at least 30 percent of the pathogens detected in the receiving waters. The human origin of these pathogens renders them more hazardous to swimmers.*
- "2. The discharge is a controllable source, and the risk it poses may be abated by additional treatment. This is not true of waters impacted by non-point sources.*
- "3. The Criteria represent a trade-off between the public's desire to swim in natural waters, and the minimum level of risk that could reasonably be achieved in 1986. CDPH questions whether this represents a level of risk that is currently 'acceptable' to the public.*
- "4. CDPH considers a 1 in 10,000 risk of infection to be an acceptable risk from exposure to treated sewage effluents, and used this as a basis for its Recycled Water Regulations. Dr. Gerba estimates that the average risk of infection from a single swimming exposure to the effluent is approximately one order of magnitude higher than this threshold. The estimated risk of infection from ten such exposures is two orders of magnitude higher."*

The results of the Discharger's health risk study show statistically significant increases in the rate of illness and infection downstream of the discharge, which exceed the DPH recommended acceptable risk from exposure from wastewater treatment plants. The Adopted Permit implements DPH's recommendation, which results in requirements for Title 22, or equivalent" disinfection to produce a pathogen-free wastewater.

4. Additional Evidence Entirely Ignored in the Permit

Dr. Gerba provided additional evidence on *Giardia* inactivation in written testimony submitted with the Discharger's 11 October 2010 comments on the Tentative Permit. Dr. Gerba pointed out that the assumption for *Giardia* viability used in the February 2010 report was overestimated. The assumption used data for *Cryptosporidium* since *Giardia* viability has not been estimated by applicable studies. According to

Dr. Gerba, *Giardia* is much more susceptible to inactivation by free chlorine and chloramines than *Cryptosporidium*. Chloramines are formed in the Discharger's current disinfection process.⁵⁴ Therefore, using "Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems using Surface Water Sources" U.S. EPA 1991, Washington DC., commonly known as the Surface Water Treatment Rule, Dr. Gerba theorized the *Giardia* detected in the effluent are non-infectious, except for a few days during the winter. Based on no infectious *Giardia* in the effluent, the risk of illness is limited to *Cryptosporidium*. The risk of illness by *Cryptosporidium* is then reduced to 1:100,000, which is less than either the Beach standard or the DPH recommended 1:10,000.

Central Valley Water Board staff reviewed Dr. Gerba's written testimony prior to finalizing the Adopted Permit. Central Valley Water Board staff have concerns with Dr. Gerba's assumptions. Dr. Gerba's analysis was not based on actual data of *Giardia* viability in SRWTP effluent. Instead, the analysis used guidance for source drinking water that is not appropriate for wastewater. The guidance assumed chloramines would be the disinfectant, and did not consider the high level of coliform associate particles unique to the SRWTP effluent. Following are our concerns with Dr. Gerba's assumptions:

1. The analysis uses chloramines as the disinfectant as is currently the case at the SRWTP. Chloramines are formed when ammonia is combined with the chlorine used to disinfect the wastewater. However, the Adopted Permit requires ammonia removal, thus chloramines can only be formed if the Discharger adds ammonia to the effluent. This is counter to eliminating ammonia in the effluent.
2. Dr. Gerba used Table E-12 in the USEPA Surface Water Treatment Rule⁵⁵ to estimate the efficiency of the current disinfection system in the inactivation of *Giardia*. Using the measured contact time and chloramines concentrations of the treatment system, Dr. Gerba calculated the actual Ct⁵⁶ values and compared them to the Ct values in Table E-12 to determine the estimated inactivation of *Giardia*. The Surface Water Treatment Rule and the tables are only applicable to filtered and non-filtered source water for use as drinking water. Furthermore, the tables are only applicable to source waters that meet specific limiting criteria (i.e., total coliform organism counts less than 100 MPN/100 ml and turbidity less than 5 NTUs). The Sacramento River water total coliform averages over 2100 MPN/100 ml and turbidity is over 22 NTUs.⁵⁷ The effluent total coliforms prior to disinfection is over 1,000,000 MPN/100ml⁵⁸ and the turbidity is nearly always greater than 5 NTUs.⁵⁹ Without filtration, Table E-12 can not be used for

⁵⁴ Gerba Written Testimony, included in the 11 October 2010 Discharger comments on the tentative permit. (SRCSD_CORR_1002_FOLDER)

⁵⁵ USEPA – Guidance Manual for Compliance with the Filtrations and Disinfection requirements for Public Water Systems Using Surface Water Sources, 1991 (SRCSD_OTHER_313)

⁵⁶ Ct value is the contact time in minutes multiplied by the chloramines concentration in mg/L.

⁵⁷ Coordinated Monitoring Program, Appendix B for Freeport (SRCSD_WEB_04)

⁵⁸ Membrane Pilot Testing at the Sacramento Regional Wastewater Treatment Plant, Steven H. Ramberg, John E. Bailhache, and Richard A. Gereg, Presentation to CVCWA, slide #17 (SRCSD_OTHER_260)

⁵⁹ Estimated Risk of Inness from Swimming in the Sacramento River, Report for SRCSD, Charles P. Gerba, February 2010, Appendix 2 (SRCSD_OTHER_148)

the Sacramento River much less secondary treated wastewater in determining appropriate Ct. The use of Table E-12 for determining inactivation of *Giardia* for secondary treated wastewater is wholly inappropriate.

3. There may be a higher than normal potential for pathogens to be associated (within) particles in secondary activated sludge effluents when low mean cell residence times (MCRT) are used in bioreactors for the pure oxygen activated sludge process used at the SRWTP. Dr. Robert Emerick's⁶⁰ research found that 20 percent of the coliform in the SRWTP effluent was associated with particles, which is nearly twice the percentage for other activated sludge treatment processes that do not utilize pure oxygen. The SRWTP secondary effluent particle counts are 1000 times greater than SRWTP filtered effluent.⁶¹ This is a concern due to the fact that the multiple-tube fermentation test used to measure the total coliform organisms does not adequately enumerate target organisms that occur in a particle-associated state. It is not unreasonable to assume if particles are shielding coliforms from disinfectants then protozoans would also be shielded. Thus, the viability of both *Cryptosporidium* and *Giardia* used in the analysis may be underestimated.

5. Summary of Evidence

Central Valley Water Board staff do not agree with the Discharger's conclusions on the evidence. The DPH recommendation is appropriate for wastewater effluents. Central Valley Water Board staff do not agree that evidence is adequate to conclude that all the *giardia* in the effluent are not viable and the increased risk of illness is limited to *cryptosporidium* as discussed above in Section C. 4. The Discharger ignores the fact that the discharge increases the risk of illness and infection. Based on its own health risk assessment, the discharge clearly causes an increase in health risk downstream of the discharge and exceeds the DPH recommendation.

The requirement of Title 22, or equivalent, disinfection is necessary to protect the beneficial uses of the receiving water and comply with the Antidegradation Policy. The site-specific analysis of increased public health risk, the implementation of best practicable treatment or control (BPTC), the recommendation by DPH⁶², the concurrence by the USEPA and the fact that the discharge is a controllable source of pathogens where the technology is feasible, reasonable and already is use by many Central Valley dischargers dictate the discharge be a pathogen free wastewater.

⁶⁰ Dr. Robert Emerick, "Factors Influencing Ultraviolet Disinfection Performance Part II: Association of Coliform Bacteria with Wastewater Particles, (Water Environment Research Volume 71, Number 6, September/October 1999) (SRCSD_OTHER_232)

⁶¹ Membrane Pilot Testing at the Sacramento Regional Wastewater Treatment Plant, Steven H. Ramberg, John E. Bailhache, and Richard A. Gereg, Presentation to CVCWA, slide #16 (SRCSD_OTHER_260)

⁶² DPH did not explicitly recommend Title 22 tertiary filtration, or equivalent, but did recommend a reduction of the public health risk caused by *giardia* and *cryptosporidium* in the effluent. The Title 22 tertiary filtration, or equivalent, requirement will accomplish the health risk reduction recommended by DPH. (SRCSD_CORR_0573)

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

See Section IV. Cost Considerations

E. Best Practicable Treatment or Control (BPTC)

The term "best practicable treatment or control" is not specifically defined in State Water Board Resolution No. 68-16 but State Water Board Order No. 2000-007⁶³ notes that one factor to be considered would be the water quality achieved by other similarly situated Dischargers and the methods used to achieve water quality.

As the most significant Discharger to the Delta, the SRWTP is "similarly situated" to all the other major wastewater treatment plants in the Delta, namely Lodi, Manteca, Stockton, and Tracy. In particular, all of these large wastewater treatment plants have tertiary filtration to remove pathogens and nitrification to remove ammonia and in most cases denitrification to remove nitrates. Furthermore, Lodi, Manteca, Stockton, Tracy have already completed wastewater treatment plant upgrades and the effluent that they are discharging is much cleaner than the Discharger's effluent. To state that the Discharger should not have to have tertiary filtration to remove pathogens and nitrification to remove ammonia and denitrification to remove nitrates when all the other major wastewater treatment plants have such processes in place and when such processes have resulted in much cleaner effluent than Discharger's effluent, would be unreasonable. In short, best practicable treatment or control includes tertiary filtration and nitrification of ammonia and denitrification to remove nitrates when these processes have been put in place by all the other major wastewater treatment plants in the Delta, the processes have resulted in much better effluent quality than Discharger's effluent, and it has occurred without significant economic or socioeconomic burdens on either Lodi, Manteca, Stockton, or Tracy.

The Central Valley Water Board considered the Discharger's Cost/Benefits Analysis and do not believe the costs associated with implementation of advanced treatment of SRWTP secondary treated effluent are disproportionate to the water quality benefits. The Central Valley Water Board found that tertiary treatment with full nitrification and denitrification is needed in order to fully protect the REC-1, agricultural, municipal, and aquatic life beneficial uses. The District's discharge accounts for over 60% of all the municipal wastewater. In addition, the District's discharge of domestic sewage contains 14 tons of ammonia per day and the average annual ammonia concentration in the River increases 11.5-fold in the Sacramento River below the District's discharge.

Even if the \$2 billion costs projected by Discharger are correct, the increased sewage treatment rate to approximately \$60 per month for each household is entirely reasonable. In addition, the fact that (1) according to a USEPA engineering contractor the cost of modifications could potentially be reduced by as much as \$859 million and achieve the same effluent quality goals; (2) another engineering consultant hired by the State Water Contractors provided a cost estimate about one-half of the District's

⁶³ In the Petition of San Luis Obispo Golf and Country Club, WQ Order No. 2000-007.

estimate; and (3) large communities in the Sacramento/Delta area that have already upgraded their treatment facilities to advanced treatment also similar to that in the Adopted Permit have sewer fees substantially less than the projected monthly fees supports the position that such costs that will need to be incurred to comply with the Adopted Permit will result in the best practicable treatment or control of the discharge necessary to assure that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.

The District claims that none of the entities listed in the table on page F-77 of the Adopted Permit are "similarly situated" Dischargers. The entities listed in the table were chosen because they are a cross-section of representative Dischargers within the Region that have upgraded to tertiary requirements. Furthermore, many of these entities are large wastewater treatment plants in the Delta (Stockton, Lodi, Manteca, and Tracy) and therefore the use of the table is entirely proper.

The District believes that they are "similarly situated" to the cities of Yuba City, Corning, and Chico. Although it is true that these facilities are not currently required to implement tertiary filtration, nitrification, or denitrification, this claim ignores the fact that all large wastewater treatment plants in the Delta, with the exception of the Sacramento Regional Facility, already provide tertiary treatment and full nitrification. Furthermore, it ignores the significantly greater average dilution for these dischargers in relation to the District's discharge. For example, the average dilution for the City of Corning is 4,100-to-1 and the average dilution for City of Chico is 400-to-1 versus the District's average dilution of 50-to-1. Finally, Yuba City, Corning, and Chico, unlike the District's discharge, do not have corresponding issues pertaining to pelagic organism decline, a high level of public contact, a major drinking water source, and extensive agricultural irrigation use. Therefore, it is not appropriate to consider the District as "similarly situated" to Yuba City, the City of Corning, and the City of Chico.

F. Conclusions Regarding Filtration

Improved effluent disinfection is required to reduce pathogen discharges to the Sacramento River. A health risk study conducted by the Discharger shows that the existing discharge increases the health risk to the public contacting Delta waters downstream of the discharge.⁶⁴ Tertiary filtration, or equivalent, will eliminate the increased pathogen health risk. Additionally, the improved treatment will improve removal of metals, organics, pesticides, Constituents of Emerging Concern (CECs), and other chemicals, and is considered Best Practicable Treatment or Control for this discharge. The District is similarly situated to other major dischargers in the Delta. Tertiary filtration is required and in place at the wastewater treatment plants for the Cities of Lodi, Manteca, Stockton, and Tracy, and Mountain House Community Services District, all major dischargers within the Delta.

⁶⁴ Estimated Risk of Illness from Swimming in the Sacramento River, Charles P. Gerba, PhD.(SRCSO_OTHER_148)

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

The Discharger contends that the Central Valley Water Board improperly denied acute and chronic aquatic life mixing zones for ammonia. The Adopted Permit includes the rationale for allowing/denying mixing zones and dilution credits (see Fact Sheet pages F-28 – F-45).

Mixing zones for ammonia were denied for two major reasons:

- 1) As a policy decision, the Central Valley Water Board determined that it is not appropriate to have an acute mixing zone occupying the majority of the cross section of the Sacramento River, given the current state of the Delta and the importance of the Sacramento River at this location to resident and migratory fish and other aquatic life in the Delta (see Adopted Permit page F-36), and
- 2) By definition, there can be no aquatic life impacts outside the mixing zone. Since there are confirmed aquatic life impacts for 50 miles down the Sacramento River and into Suisun Bay from ammonia, none of these waters are "outside" of the mixing zone of the current ammonia discharge, because beneficial use impacts are occurring in these waters.⁶⁵ Therefore, the Central Valley Water Board did not grant a mixing zone as requested by the Discharger.

The Central Valley Water Board has the discretion to accept or deny mixing zones and dilution credits⁶⁶. The Clean Water Act (CWA) directs states to adopt water quality standards to protect the quality of its waters. USEPA's current water quality standards regulation authorizes states to adopt general policies, such as for mixing zones, to implement state water quality standards (40 CFR section 122.44 and section 122.45). The USEPA allows states to have broad flexibility in designing its mixing zone policies. Primary policy and guidance on determining mixing zone and dilution credits is provided by the SIP and the Basin Plan. The Central Valley Water Board implemented mixing zone requirements contained in the SIP and the Basin Plan when considering whether dilution credits are appropriate in the Adopted Permit.

The allowance of mixing zones by the Central Valley Water Board is discussed in the Basin Plan, *Policy for Application of Water Quality Objectives*, which states in part, "In conjunction with the issuance of NPDES and storm water permits, the Regional Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional Board that the mixing zone will not adversely impact beneficial uses. If allowed, different mixing zones may be designated for different types of objectives, including, but not limited to, acute aquatic life objectives, chronic aquatic life objectives, human health objectives, and acute and chronic whole effluent toxicity objectives, depending in part on the averaging period over which the objectives apply. In determining the size of such mixing zones, the Regional Board will consider the applicable procedures and guidelines in the EPA's Water Quality Standards

⁶⁵ Dr. Swee Teh: Full Life-Cycle Bioassay Approach to Assess Chronic Exposure of *Pseudodiaptomus forbesi* to Ammonia/Ammonium (SRCSD_OTHER_297) & Richard Dugdale: The Role of Ammonium and Nitrate in Spring Bloom Development in San Francisco Bay (SRCSD_OTHER_366).

⁶⁶ See Transcript at p. 110 (SRCSD_BM_13), see also SIP Section 1.4.2.

*Handbook and the [TSD]. Pursuant to EPA guidelines, mixing zones designated for acute aquatic life objectives will generally be limited to a small zone of initial dilution in the immediate vicinity of the discharge.*⁶⁷

Section 1.4.2 of the SIP states, in part, "...with the exception of effluent limitations derived from TMDLs, in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a basin plan, the Regional Board may grant mixing zones and dilution credits to dischargers ... The applicable priority pollutant criteria and objectives are to be met throughout a water body except within any mixing zone granted by the Regional Board. The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis. The Regional Board may consider allowing mixing zones and dilution credits only for discharges with a physically identifiable point of discharge that is regulated through an NPDES permit issued by the Regional Board."⁶⁸

USEPA warns that, "Mixing zone allowances will increase the mass loadings of the pollutant to the water body, and decrease treatment requirements. They adversely impact immobile species, such as benthic communities, in the immediate vicinity of the outfall. Because of these and other factors, mixing zones must be applied carefully, so as not to impede progress toward the Clean Water Act goals of maintaining and improving water quality."⁶⁹

A mixing zone is defined as an area around the outfall in which water quality objectives may be exceeded, but is otherwise protective of beneficial uses.⁷⁰ Dilution is defined as the amount of mixing that has occurred at the edge of this mixing zone under critical conditions, thus protecting beneficial uses at the discharge concentration and for the duration and frequency required.

When determining to allow dilution credits for a specific pollutant several factors must be considered, such as available assimilative capacity, facility performance, and the State Water Board's antidegradation policy⁷¹, which requires best practicable treatment or control of the discharge. These factors were considered in the denial of mixing zones for ammonia.

⁶⁷ Basin Plan, page IV-16.00

⁶⁸ SIP, pg. 15

⁶⁹ USEPA TSD, p 33

⁷⁰ See, e.g., *EPA Water Quality Standards Handbook, Second Edition* (August 1994) at p. 5-2 noting that a mixing zone is "[a] limited area or volume of water where initial dilution of a discharge takes place and where numeric water quality criteria can be exceeded but actual toxic conditions are prevented." See also, SIP at Appendix 1-4, stating that a mixing zone is "a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body."

⁷¹ State Water Board Resolution 68-16.

The District's discharge is the predominant source of ammonia to the Delta^{72,73}, discharging, on average, 14 tons of ammonia per day. Ammonia is one of several stressors contributing to the catastrophic decline of the aquatic life of the Delta.^{74,75,76} The Adopted Permit includes end-of-pipe (no dilution) final ammonia effluent limits based on the 1999 U.S. EPA ammonia criteria to implement the Basin Plan's narrative toxicity objective. No mixing zones are allowed because the mixing zone conditions of the SIP were not met for ammonia, due to concerns of toxicity impacts attributed to the heavy loading of ammonia into the Delta, downstream of the discharge, referred to as "far-field impacts". In addition, the allowance of mixing zones for ammonia would have corresponded with a continued loading of ammonia that adversely impacts beneficial uses, and would not be in compliance with federal and state antidegradation policies. As the Central Valley Water Board determined that a mixing zone for ammonia will adversely impact beneficial uses, it used its discretion to deny the Discharger's request, and require the Discharger to implement Best Practical Treatment or Control for ammonia reduction.⁷⁷

A. Far-Field Impacts Are Unrelated To Acute And Chronic Mixing Zone Determinations.

1. Purpose of Mixing Zones

According to the SIP Section 1.4.2, "The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis." The Discharger states "...the Regional Board relied improperly on effects far downstream of concentrations well below U.S. EPA's ammonia criteria to find that allowance of mixing zones for ammonia would affect beneficial uses and compromise the integrity of the water body. Unless and until other criteria are properly adopted or determined, mixing zones must be allowed." Their contention is that only the 1999 U.S. EPA ammonia criteria for freshwater aquatic life should be considered when evaluating compliance with the mixing zone conditions in the SIP, Section 1.4.2.2 – Mixing Zone Conditions. This is simply not the case.

When evaluating to allow or deny mixing zones and dilution, it is necessary to consider all available information to ensure protection of the beneficial uses. The

⁷² 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. (SRCSD_OTHER_372)

⁷³ Foe, C., A. Ballard, S. Fong, Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta (SRCSD_OTHER_157)

⁷⁴ Bennett, W.A. 2005. Critical assessment of delta smelt population in the San Francisco estuary, California. San Francisco Estuary and Watershed Science. Vol. 3, Issue 2, Article 1 (SRCSD_OTHER_302)

⁷⁵ Rosenfield, J.A and R.D. Baxter. 2007. Population dynamics and distribution patterns of longfin smelt in the San Francisco Estuary. Transactions American Fisheries Society 136:1577-1592 (SRCSD_OTHER_393)

⁷⁶ Sommer, T., C. Armor, R. Baxter, R. Breuer, L. Brown, M. Chotkowshi, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Soger, M. Nobriga, and K. Souza. 2007. The collapse of pelagic fishes in the upper San Francisco Estuary. Fisheries 32(6):270-277. (SRCSD_OTHER_364)

⁷⁷ The Discharger seems to suggest that the failure to grant a mixing zone for ammonia is an abuse of discretion by the Central Valley Water Board. As noted previously, the Central Valley Water Board has articulated a sufficient basis for not granting a mixing zone for ammonia. The Discharger apparently neglects to realize that the discharge of waste to waters of the state—in this case virtually all of the ammonia contribution to the Delta and amounting to 14 tons of ammonia per day on average, is a privilege, not a right. (Water Code section 13263, subdivision (g).)

SIP Section 1.4.2.2.B. states "*The RWQCB shall deny or significantly limit a mixing zone and dilution credit as necessary to protect beneficial uses, meet the conditions of this Policy, or comply with other regulatory requirements.*"

In the Adopted Permit, the mixing zones for ammonia were denied primarily due to the far-field effects of the ammonia in the Delta. The far-field effects of the discharge that occur downstream of a proposed near-field mixing zone must be considered. The Discharger contends that far-field impacts of ammonia cannot be considered when determining to grant acute and chronic aquatic life mixing zones. To the contrary, USEPA states that far-field impacts, such as bioaccumulation, should be considered. It states the following in the TSD:

*"While fish tissue contamination tends to be a far-field problem affecting entire waterbodies rather than a narrow-scale problem confined to mixing zones, **restricting or eliminating mixing zones for bioaccumulative pollutants may be appropriate** under conditions such as the following:*

- "• **Mixing zones might be denied where such denial is used as a device to compensate for uncertainties in the protectiveness of the water quality criteria or uncertainties in the assimilative capacity of the waterbody.**" (emphasis added)⁷⁸*

Although ammonia is not a bioaccumulative pollutant, this guidance from USEPA clearly recommends considering the far-field impacts of allowing mixing zones. The evidence in the record demonstrates that ammonia is causing far-field impacts. One of the reasons for denying the mixing zones for ammonia in the Adopted Permit was due to uncertainty of the protectiveness of the USEPA 1999 ammonia criteria from impacts other than the toxicity to fish near the discharge, such as impact to the basic food chain supporting aquatic life and the ecosystem as a whole. This is discussed in greater detail below.

2. The Regional Board's Denial Based on the SIP is unrelated to Acute and Chronic Mixing Zones

Acute and Chronic Mixing Zones for Ammonia do not Meet SIP Requirements

If the Central Valley Water Board was to allow an acute and chronic aquatic life mixing zone for ammonia as proposed by the Discharger, and final water quality-based effluent limits were to be established using the Discharger's dynamic model, this would result in effluent limits that the Discharger can currently meet (i.e., 37 mg/L and 47 mg/L as an average monthly and maximum daily, respectively).^{79,80} Therefore, no additional treatment beyond the existing conventional secondary system that has been in place since 1982 would be required to reduce ammonia loadings to the Delta. The concerns of the toxic impacts that ammonia currently has

⁷⁸ USEPA TSD p. 34

⁷⁹ Low Dissolved Oxygen Prevention Assessment, May 2010 (SRCSD_OTHER_122B)

⁸⁰ 25 March 2010 and 20 April 2010 meeting handouts (SRCSD_CORR_0523 & 0518))

on the aquatic food chain and ecosystem of the Delta were considered when evaluating compliance with the SIP mixing zone requirements.

The SIP requires, in part, that mixing zones do not;

- (1) compromise the integrity of the entire water body;
- (2) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws; and
- (3) produce undesirable or nuisance aquatic life;

The allowance of acute or chronic mixing zones for ammonia do not meet these requirements, because the high levels of ammonia in the discharge from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta, not just the areas defined by the requested mixing zones in the Sacramento River. As discussed below, the allowance of the requested mixing zones for ammonia would (1) compromise the biological integrity of the entire water body, (2) adversely impact biologically sensitive species and critical aquatic habitats, and (3) produce undesirable or nuisance, as follows.

- (1) Compromise the integrity of the entire water body;

Ammonia is toxic at different concentrations under different conditions, with different aquatic species.

- Ammonia levels in the Sacramento River are sufficient to be toxic to copepods (aquatic insects) from the point of discharge to Rio Vista, 35 miles downstream of the discharge.^{81,82,83,84}
- Ammonia is an oxygen demanding substance. When ammonia is discharged to water bodies it converts to other nitrogen substances. This conversion requires oxygen. Oxygen is taken from the Sacramento River, which causes the dissolved oxygen supply for aquatic life to decrease. This is occurring for 35 miles downstream to Rio Vista.⁸⁵
- Ammonia inhibits primary production of diatoms (algae). Ammonia will diminish algae's ability to intake nitrate as a nutrient, thus starving the existing algae species of its necessary nutrition. The ammonia loading due to the Facility's current discharge is at levels that reduce primary production of algae for 50 miles downstream of the discharge location, at Suisun Bay.^{86,87,88,89}

⁸¹ Foe, C., et al, July 2010 Nutrient Concentration and Biological Effects in the Sacramento-San Joaquin Delta (SRCSD_OTHER_170)

⁸² Teh, S., Full Life Cycle Bioassay Approach to Assess Chronic Exposure of *Pseudodiplomus forbesi* to Ammonia/Ammonium, July 2010 (SRCSD_OTHER_297)

⁸³ 10 November 2010 letter to CVRWQCB from Dr. Swee Teh summarizing copepod results (SRCSD_CORR_1061)

⁸⁴ Foe, C. Hearing Transcript, pages 407-411 (SRCSD_BM_13)

⁸⁵ LWA, Low Dissolved Oxygen Prevention Assessment, May 2010 (SRCSD_OTHER_122B)

⁸⁶ Wilkerson, F.R., Dugdale, V. Hogue, and A. Marchi, 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. *Estuaries and Coasts* 29(3): 401-416. (SRCSD_OTHER_367)

- Ammonia is a nutrient along with its converted form, nitrate. (Ammonia will slowly convert to nitrate in the receiving water.) Too much of either form of nitrogen (ammonia or nitrate) causes excessive algal blooms that cause increased treatment costs and create taste and odor problems for downstream water treatment systems.⁹⁰ According to the Water Agencies⁹¹, these impacts are felt as far downstream as Los Angeles.⁹² Furthermore, ammonia is a precursor for Nitrosodimethylamine (NDMA), which is very toxic to humans and a possible carcinogen. This is a problem for water treatment plants, because NDMA can form if the precursors, constituents that make up NDMA, are in the drinking water intake source water.⁹³

Although the chronic mixing zone was proposed by the Discharger to extend only 350 feet downstream of the point of discharge, less-stringent water quality-based effluent limits (with dilution credits), based on USEPA's ammonia criteria, will result in an ammonia loading that impacts aquatic life and human health beneficial uses of the receiving waters far downstream of 350 feet, and, thus, will compromise the integrity of the entire waterbody.⁹⁴

- (2) Adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;

Ammonia from the Facility is currently impacting the food supply for Delta smelt and other aquatic life within the food chain in the Sacramento River, the Delta and in Suisun Bay.⁹⁵ The allowance of a mixing zone for ammonia as proposed by the Discharger will continue to allow these impacts. Thus, the Central Valley Water Board properly did not grant mixing zones for ammonia.

- (3) Produce undesirable nuisance;

⁸⁷ Dugdale, F. F. Wilerson, V. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring Bloom development in San Francisco Bay. *Estuarine, Coastal and Shelf Science*, 73:17-29. (SRCSD_OTHER_366)

⁸⁸ See Transcript at p. 434. ("Regarding ammonia, it is clear that ammonia is killing or inhibiting portions of the delta aquatic system.") (SRCSD_BM_13)

⁸⁹ Primary production in the Delta is in the bottom ten percent in 113 estuaries evaluated around the world. (Transcript at p. 125.) The District's discharge will exacerbate the low levels of primary production. (SRCSD_BM_13)

⁹⁰ "All that ammonium has been converted the nitrate, is excessful to the algae. We get blooms in our reservoirs and canals, odor complaints, filter clogging, need for additional treatment." (Transcript at p. 295.) (SRCSD_BM_13)

⁹¹ The Water Agencies consist of the following agencies: Alameda County Water District, Alameda County Flood Control and Water Conservation District, Zone 7, Contra Costa Water District, Kern County Water Agency, Metropolitan Water District of Southern California, San Luis & Delta Mendota Water Authority, Santa Clara Valley Water District, State & Federal Contractors Water Agency, State Water Contractors and Westlands Water District

⁹² Water Agencies "Summary of Drinking Water Quality Issues – Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal. December 2007 (SRCSD_OTHER_085)

⁹³ DiGiorgio, Investigation into the sources of nitrosamines and their precursors in the Sacramento-San Joaquin Delta, CA (SRCSD_OTHER_239)

⁹⁴ Swee Teh: Full Life-Cycle Bioassay Approach to Assess Chronic Exposure of *Pseudodiptomus forbesi* to Ammonia/Ammonium (SRCSD_OTHER_297) & Richard Dugdale: The Role of Ammonium and Nitrate in Spring Bloom Development (SRCSD_OTHER_366)

⁹⁵ Swee Teh: Full Life-Cycle Bioassay Approach to Assess Chronic Exposure of *Pseudodiptomus forbesi* to Ammonia/Ammonium (SRCSD_OTHER_297) & Richard Dugdale: The Role of Ammonium and Nitrate in Spring Bloom Development (SRCSD_OTHER_366)

As discussed above, nitrogen from ammonia is a nutrient. Nutrients can cause excessive algae growth that in turn creates nuisance and problems for the filtration systems of existing water treatment systems with surface water intakes. According to water agencies, these impacts are felt as far away as Los Angeles^{96,97}.

Allowance of Acute and Chronic Mixing Zones for Ammonia do not Comply with the State Antidegradation Policy, Resolution 68-16

The current discharge of ammonia is adversely impacting the Sacramento River, the Delta and downstream water bodies. To be in compliance with the State Water Board's Antidegradation Policy (Resolution 68-16) best practicable treatment or control (BPTC) of the discharge is required. Wastewater treatment technologies are available and commonly used at wastewater treatment plants in the Central Valley and statewide for nitrification of wastewater to convert ammonia to nitrate. In the Adopted Permit it was determined that full nitrification of the wastewater to reduce ammonia concentrations is BPTC for this municipal discharge. All major municipalities discharging to the Delta are currently nitrifying their wastewater to remove ammonia.⁹⁸ These facilities are similarly situated to the Facility. See response to Statement of Points and Authorities, Section VIII.D.3 for the discussion regarding "similarly situated" facilities.

The Central Valley Water Board considered all information in the administrative record including consultations with federal and State wildlife and fishery agencies. Denial of mixing zones for ammonia to protect aquatic life beneficial uses is consistent with recommendations from the Department of Water Resources (DWR)⁹⁹, USEPA, Region 9¹⁰⁰, the California Department of Fish and Game¹⁰¹ (DFG), the U.S. Fish and Wildlife Service¹⁰² (USFWS), the National Marine Fisheries Service¹⁰³ (NMFS) and the lead scientist for the Delta Stewardship Council.¹⁰⁴

⁹⁶ Water Agencies "Summary of Drinking Water Quality Issues – Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal. December 2007 (SRCSD_OTHER_085).

⁹⁷ "According to the water agencies, these impacts are felt as far away as Los Angeles." (Transcript at p. 124). "Increased algae creates water treatment plant operational problems, and taste and odor problems." (Transcript at p. 136.) (SRCSD_BM_13)

⁹⁸ Waste Discharge Orders for the Cities of Stockton, Manteca, Lodi, Tracy, Galt, and Roseville (SRCSD_PPO_30 & 27 & 28 & 35 & 19 & 44 & 13)

⁹⁹ 1 October 2010 letter from Gerald E. Johns to Kathy Harder, Comments on the SRCSD Tentative NPDES permit renewal for the SRWTP (SRCSD_CORR_0826)

¹⁰⁰ 7 October 2010 letter from Alexis Strauss to Pamela Creedon, Tentative Order/Draft NPDES Permit for the SRCSD, SRWTP (SRCSD_CORR_0942)

¹⁰¹ 7 October 2010 letter from Carl Wilcox to Kenneth D. Landau, Response to the proposed NPDES permit renewal for the SRCSDSRWTP (SRCSD_CORR_0938)

¹⁰² 6 October 2010 letter from Dan Castleberry to James D. Marshall, Comments on the September 3, 2010 Tentative Waste Discharge Requirements Renewal (NPDES No. CA0077682) for the SRCSD, SRWTP (SRCSD_CORR_0901)

¹⁰³ 13 October 2010 letter from Maria Rea to James D. Marshall (SRCSD_CORR_2126)

¹⁰⁴ 7 October 2010 letter from Phil Isenberg to Katherine Harl (SRCSD_CORR_0936)

The Discharger in its petition continues to misdirect the ammonia arguments to fish toxicity near the discharge, which was not used by the Central Valley Water Board as the technical basis for denying the mixing zones for ammonia, and ignores or discredits site-specific research regarding the impact of ammonia on the Delta, conducted and accepted by the Central Valley Water Board's scientists and the Delta Stewardship Council's lead scientist. Ample evidence is provided in the Adopted Permit Fact Sheet and administrative record as to why acute and chronic aquatic life mixing zones must consider more than just USEPA's 1999 ammonia criteria, as described below.

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

The Discharger contends that the acute and chronic mixing zones do not compromise the integrity of the entire water body due to the relative size of the mixing zones to the size of the Sacramento River. The Discharger is ignoring the overwhelming evidence provided in the Adopted Permit¹⁰⁵, and by stakeholders that present ammonia concentrations are impacting beneficial uses for many miles downstream outside of the mixing zone. Four distinct impacts occur throughout the downstream water bodies due to discharge of ammonia from the SRWTP. These impacts are low dissolved oxygen, inhibition of nitrate uptake by diatoms, copepod toxicity, and excessive nutrients.¹⁰⁶

The violation of the Basin Plan's low dissolved oxygen water quality objective has been documented between the discharge point and Rio Vista, 35 miles downstream of the discharge, by several independent agencies^{107,108}, including the Discharger. The United States Geological Services (USGS), California Data Exchange Center (CDEC), Coordinated Monitoring Program (CMP), Central Valley Water Board, Environmental Monitoring Program (EMP), and Water Data Library (DWR-MWQI) databases¹⁰⁹ show dissolved oxygen concentrations less the Basin Plan water quality objective of 7.0 mg/L. Additional detail regarding low dissolved oxygen is provided in the response to Statement of Points and Authorities, Section VI.B.2, below.

Ammonia is inhibiting nitrate uptake and therefore primary production rates for diatoms as far downstream in the Delta as Suisun Bay¹¹⁰, 50 miles downstream of the discharge.¹¹¹ Ammonia-induced inhibition of nitrate uptake prevents spring algal blooms from developing in Suisun Bay when conditions are otherwise

¹⁰⁵ Appendix J of the NPDES permit Order R5-2010-0114 (SRCSD_CORR_3000)

¹⁰⁶ CVRWQCB Presentation for the 9 December 2010 Board Meeting, Slide numbered 86. (SRCSD_BM_25)

¹⁰⁷ Copy of DO_Memo_Appendix_C_Data (SRCSD_DATA_024)

¹⁰⁸ http://www.water.ca.gov/waterdatalibrary/waterquality/station_county/select_station.cfm?URLStation=C3A&source=map

¹⁰⁹ Copy of DO_Memo_Appendix_Data and MWQI_HOOD (SRCSD_DATA_024 & 62)

¹¹⁰ Alexander Parker: Biogeochemical Processing of Anthropogenic Ammonium in the Sacramento River and the northern San Francisco Estuary, Consequences for Pelagic Organism Decline Species (SRCSD_OTHER_236)

¹¹¹ A. Marchi: Spring 2010 Phytoplankton Blooms in Northern San Francisco Estuary: Influences of Climate and Nutrients (SRCSD_OTHER_235)

favorable.¹¹² Diatoms are an important part of the phytoplankton community in the Delta. Lower phytoplankton primary production rates elsewhere in the world have been associated with smaller yields of fish. The primary production rate for the Delta is among the lowest of any estuary in the world.¹¹³ Low primary production rates have been hypothesized to be one potential cause of the POD.¹¹⁴

Additional detail regarding nitrate inhibition is provided in the response to Statement of Points and Authorities, Section VI.B.1.c, below.

Ammonia is toxic to early life stages of *P. forbesi*.^{115,116,117} Toxic concentrations of ammonia are found in the Sacramento River from the discharge point to Rio Vista, 35 miles downstream of the discharge. *P. forbesi* is an important food organism for the young of many fish species in the Delta including both delta smelt and longfin smelt, two State listed species. According to United States Fish and Wildlife Service (USFWS) delta smelt range from San Pablo Bay upstream to about Verona on the Sacramento River with the majority of the population occupying the range extending from western Suisun Bay/Marsh to about the City of Sacramento, above the discharge location.¹¹⁸ Additional detail regarding copepod toxicity is provided in the response to Statement of Points and Authorities, Section VI.B.1.b, below.

Ammonia is a nutrient along with its converted form nitrate. Too much nitrogen in either in ammonia or nitrate form causes excessive algal growth when Delta water is pumped into canals and reservoirs that are not light-limited like the Delta. The resulting algal blooms can create nuisance problems for downstream water treatment systems. According to the Water Agencies, these impacts are occurring in drinking water holding reservoirs in Los Angeles County.^{119,120} Additional detail regarding excessive nutrients is provided in the response to Statement of Points and Authorities, Section VI.A.2.c, below.

¹¹² Parker: Biogeochemical Processing of Anthropogenic Ammonium in the Sacramento River and the northern San Francisco Estuary, Consequences for Pelagic Organism Decline Species (SRCSD_OTHER_236)

¹¹³ Draft Final Report-Effect of Ammonium and Wastewater Effluent on Riverine Phytoplankton in the Sacramento River, CA., Parker et al. (SRCSD_OTHER_341)

¹¹⁴ American Fisheries Society: Collapse of San Francisco Bay Pelagic Fishes (SRCSD_OTHER_364)

¹¹⁵ Foe, C., Ballard, and S. Fong 2010. Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta, (SRCSD_OTHER_157)

¹¹⁶ Swee Teh: Full Life-Cycle Bioassay Approach to Assess Chronic Exposure of *Pseudodiaptomus forbesi* to Ammonia/Ammonium (SRCSD_OTHER_297)

¹¹⁷ Letter from Swee Teh of UC Davis to Chris Foe of the Central Valley Water Board regarding Bioassay to assess chronic exposure to ammonia (SRCSD_CORR_1062)

¹¹⁸ USFWS letter to Kathleen Harder dated 15 June 2010. (SRCSD_CORR_0574)

¹¹⁹ December 2007 letter from the Water Agencies to Ms. Pamela C. Creedon (SRCSD_OTHER_085)

¹²⁰ Dr. Brewster Testimony, Transcript page 295. (SRCSD_BM_13)

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

The Discharger's wastewater diffuser is located on the bottom of the Sacramento River at Freeport. This area is designated critical habitat for five federally-listed fish species (i.e., Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook salmon (*O. tshawytscha*), California Central Valley steelhead (*O. mykiss*), Southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*), and delta smelt (*Hypomesus transpacificus*), and essential fish habitat (EFH) for Pacific salmon. Additionally, the starry flounder, northern anchovy and English sole also have designated EFH within Suisun Bay which is impacted by the discharge.¹²¹

The Discharger states, "...the permit fails to include findings ...that discharges from the SRWTP are adversely impacting biologically sensitive or critical habitats—inside or outside of the acute and chronic aquatic life mixing zones". Evidence was presented by Central Valley Water Board staff that ammonia concentrations inhibited diatom primary production rates and caused *P. forbesi* toxicity outside the mixing zone. Inhibition of diatom growth by elevated ammonia concentrations has been documented between Rio Vista and Suisun Bay. This is a primary spawning and nursery area for delta smelt and longfin smelt and an important rearing area for striped bass. Ambient ammonia concentrations are also sufficiently high to cause toxicity to the copepod *P. forbesi* as far downstream as Isleton (28 miles downstream of the discharge). The Sacramento River between the discharge and Isleton is a rearing area for striped bass. Phytoplankton, such as diatoms, are a primary food resource for many zooplankton species including *P. forbesi* and these in turn are a major item in the diet of all three of the above fish species. Therefore, the discharge is adversely affecting critical fish habitat by reducing, both directly and indirectly, the amount of available food for the young of these three important fish species. The conclusion that the collapse of these fish populations might be caused by the quantity and quality of available food is not new. The hypothesis was first presented in the peer reviewed literature in 2007 and has been termed the "bottom-up" hypothesis.¹²² What is new is the emerging information about the effect of ammonia on diatom production and *P. forbesi* reproduction and survival.

Due to the significant population declines of the species identified above, data indicating that ammonia in the discharge is impacting the food chain, and the fact that the Facility's wastewater is discharged directly into this designated critical habitat, the Central Valley Water Board found that the discharge causes and/or contributes to impacts on these species. The Central Valley Water Board does

¹²¹ United States Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service letter transmitted October 13, 2010 to James Marshall, CVRWQCB. (SRCSD_CORR_2126)

¹²² American Fisheries Society: Collapse of San Francisco Bay Pelagic Fishes (SRCSD_OTHER_364)

not need direct evidence that the discharge is solely causing such impacts prior to establishing effluent limitations that are to protect these biologically sensitive species and critical habitats. The fact that up to 181 million gallons per day of municipal wastewater containing 14 tons per day of ammonia is being discharged into such a habitat is a compelling factor for the Central Valley Water Board to establish requirements based on the known impacts to the food chain and the likely direct acute and chronic toxicity impact ammonia poses on these species.

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

Mixing zone condition #5 of the SIP prohibits mixing zones if they, "produce undesirable or nuisance aquatic life". The Discharger conjectures that, "effects on copepods, diatom primary production and shifts in algal species" was the reason that the mixing zone was denied under SIP condition #5. This is not correct. The Central Valley Water Board denied a mixing zone under condition #5 because the Water Agencies¹²³ provided credible testimony that the high nutrient concentrations (ammonia and nitrate) from the SRWTP were causing excessive algal growth and creating taste and odor, as well as, operational problems at their drinking water reservoirs and water treatment plants.¹²⁴ The undesirable nuisance algae and weeds are controlled by copper algicides and the resulting dead material creates taste and odor problems and clogs water treatment plant filters.

Finally, Dr. Cliff Dahm, lead scientist for the Delta Stewardship Council, testified at the Hearing that reducing the ammonia loading to the Delta would also reduce blooms of *microcystis aeruginosa*, a toxin producing algae. He also said that the reduced ammonia loading would reduce the nuisance non-native submerged aquatic vegetation, watercress and *Egeria densa*.¹²⁵

B. The Regional Board's Findings for Denial of Mixing Zones are not Supported by Evidence in the Record.

1. Findings Regarding Far Field Aquatic Life Impacts are not Supported by Evidence in the Record.

The Discharger is correct that the biological effect of elevated concentrations of ammonia and other nutrients in the Delta has been an active area of research. A summary of the results of the ongoing research is included in Appendix J of the Adopted Permit. Some hypotheses, like the assertion that ambient ammonia concentrations in the Delta exceeded USEPA criteria or were sufficiently high to be toxic to the young of sensitive fish species, were not supported by recently collected monitoring data¹²⁶ and is so noted in Appendix J. Other hypotheses,

¹²³ December 2007 letter from the Water Agencies to Ms. Pamela C. Creedon (SRCO_OTHER_085)

¹²⁴ Dr. Brewster Testimony, Transcript page 295. (SRCSD_BM_13)

¹²⁵ Dr. Dahm Testimony, Transcript pages 238-240. (SRCSD_BM_13)

¹²⁶ Foe, C., Ballard, and S. Fong 2010. Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta, (SRCSD_OTHER_157)

like the fact that ammonia inhibited nitrate uptake by diatoms and reduced primary production rates, are documented in a series of peer reviewed journal articles.¹²⁷ In addition, all these studies were reviewed and accepted by the ammonia subcommittee of the Interagency Ecological Program Contaminant Workgroup, a collection of local State and Federal Agency and University researchers. The subcommittee includes staff from the District.

The Discharger is also correct that the State Water Board considered the effect of other stressors, including ammonia, as part of their recent *Proceeding for Development of Flow Criteria*. The State Water Board stated in its Summary Determinations for the Proceeding.... "*The Central Valley Regional Water Quality Control Board should require additional studies and incorporate discharge limits and other controls into permits, as appropriate, for the control of nutrients and ammonia*". The State Water Board did not conclude as alleged by the Discharger that "...only more study is appropriate".¹²⁸

Absolute consensus of the experts almost never occurs in science. This is also true about the overall ecological effect of ammonia in the Delta. For example, there is a broad consensus that ammonia inhibits brackish diatom production but there is less certainty in the scientific community about the overall ecological effect of low spring phytoplankton levels on the growth and survival of endangered POD fish species that reproduce and rear in the Bay-Delta. Likely, we will never know for sure what all the effects of low primary production rates are on resident fish. Nonetheless, the results of all the ecological studies were summarized for the Hearing in Appendix J and it was the unanimous judgment of the Central Valley Water Board that sufficient evidence had been presented to indicate that beneficial use impairments were occurring and to warrant adopting a permit that included nitrification to reduce downstream ammonia concentrations.

a. Evidence In The Record Demonstrates That Ammonia Is Not Causing Acute Or Chronic Toxicity To Delta Fish

The Discharger continues to misdirect the ammonia argument to fish toxicity. Fish toxicity was not the basis for denying a mixing zone for ammonia and requiring nitrification to reduce downstream ammonia concentrations. The Adopted Permit, in Appendix J, states that downstream ambient ammonia concentrations from the District are not acutely toxic to Delta fish. However, the record is less clear about whether ambient ammonia concentrations cause chronic toxicity to Delta smelt and the young of other sensitive fish species. Drs. Engle and Foe used Acute to Chronic Ratios (ACRs) for fathead minnows¹²⁹ (there are no ACRs for Delta smelt) and concluded that chronic smelt toxicity was unlikely to occur. However, neither analysis included data collected at receiving

¹²⁷ Wilkerson, F.R., Dugdale, V. Hogue, and A. Marchi, 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. *Estuaries and Coasts* 29(3): 401-416. (SRCSD_OTHER_367)

¹²⁷ Dugdale, R. F. Wilerson, V. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring Bloom development in San Francisco Bay. *Estuarine, Coastal and Shelf Science*, 73:17-29. (SRCSD_OTHER_366)

¹²⁸ Development of Flow Criteria for the Sacramento-San Joaquin Delta (SRCSD_OTHER_308)

¹²⁹ USEPA, Ammonia Criteria Update, 1999, Table 7, Page 136-137.

water monitoring location RSW-003 at Cliff's Marina. Cliff's Marina is 4200 feet downstream of the discharge and is outside of the Discharger's proposed chronic mixing zone for ammonia. The Water Agencies analyzed the District's RSW-003 ammonia data and found, based on an ACR analysis, that chronic toxicity might occur about 12 percent of the time.¹³⁰ Dr. Werner also concluded that delta smelt toxicity might occur further downstream in the Delta when pH was greater than 8.0¹³¹. The Central Valley Water Board considered the pH information and concluded that pH excursions above 8.0 were rare and of too short a duration to likely cause chronic toxicity.

In summary, no evidence is available that ammonia concentrations are directly killing fish either inside or outside the mixing zone. Some evidence was presented at the Hearing that ambient downstream ammonia concentrations might cause chronic toxicity to sensitive fish like delta smelt. Central Valley Water Board found this information to be too speculative to list as justification for requiring nitrification. Nonetheless, the adopted ammonia end-of-pipe effluent limits would prevent chronic toxicity to delta smelt and other sensitive species should it be occurring at Cliff's Marina or further downstream.

b. The Permit Findings Regarding Acute And/Or Chronic Toxicity To Delta Copepods (*Eurytemora Affinis* And *Pseudodiaptomus Forbesi*) Are Based On Preliminary And Questionable Study Results That Do Not Constitute Appropriate Water Quality Criteria

The Central Valley Water Board considered Dr. Swee Teh's 31-day full life-cycle bioassay results with *P. forbesi* to deny a mixing zone and support the need for downstream ammonia reduction. The full life-cycle test results were presented at a July 2010 meeting of the IEP Contaminant Work Team.¹³² As reported in Appendix J of the Adopted Permit, the results demonstrated that *P. forbesi* reproduction and/or nauplii (a juvenile life stage for copepods) survival was negatively affected by ammonia concentrations as low as 0.36 mg N/L. Ammonia concentrations greater than this are routinely measured for up to 30 miles downstream of the SRWTP while concentrations in the Sacramento River above the SRWTP are an order of magnitude lower.^{133,134} Central Valley Water Board staff asked Dr. Swee Teh to repeat just the reproduction/nauplii survival part of the bioassay procedure because the previous results showed aquatic toxicity at ammonia concentrations much lower than the recommended USEPA criteria to protect freshwater aquatic organisms. Dr. Swee Teh did so and reported the results to Central Valley Water Board staff in a letter dated

¹³⁰ 1 June 2010 Letter from Alameda County Water District et al, (SRCSD_CORR_0551)

¹³¹ Inge Werner, UC Davis: The Effects of Wastewater Treatment Effluent-Associated Contaminants on Delta Smelt, Ammonia Toxicity Sampling and Analysis Plan (SRCSD_OTHER_213)

¹³² Swee Teh: Full Life-Cycle Bioassay Approach to Assess Chronic Exposure of *Pseudodiaptomus forbesi* to Ammonia/Ammonium (SRCSD_OTHER_297)

¹³³ Foe, C., Ballard, and S. Fong 2010. Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta, (SRCSD_OTHER_157)

¹³⁴ See also Transcript at p. 125 noting that ammonia is toxic to *Pseudodiaptomus forbesi* as far downstream as Rio Vista, (SRCSD_BM_13)

10 November 2010.¹³⁵ The new study results confirmed the original study and again indicated that reproduction and nauplii survival was statistically less than the control at ammonia concentrations greater than 0.36 mg N/L.

i. The Permit Relies On A Sub-Set Of Study Results That Uses Misrepresentative pH

Ammonia exists in water in an ionized (IA) and un-ionized (UIA) form. The fraction of un-ionized ammonia increases with increasing temperature and pH. Total ammonia (TAN) is the sum of the ionized and un-ionized forms. Un-ionized ammonia is the more toxic form to fish while ionized ammonia is more harmful to invertebrates such as *P. forbesi*.

The Discharger alleges that the Central Valley Water Board misrepresented the pH of the Sacramento River and, therefore, what constituted a toxic amount of ammonia. This is not true. The pH of the Sacramento River is almost irrelevant because *P. forbesi* is most sensitive to the ionized form of ammonia. As noted by Dr. Swee Teh in his letter of 10 November 2010, "*Results of this study suggested that P. forbesi is more sensitive to ionized ammonia (IA) than unionized ammonia (UIA). Furthermore, since 98-99% of the total ammonia is in ionized form which is the most toxic fraction to P. forbesi, all ammonia studies will be expressed in terms of total ammonia nitrogen (TAN)*". The average total ammonia concentration in the Sacramento River at Hood, about 10 miles below the SRWTP, was 0.46 mg N/L. This is about 30 percent higher than the reported low observed effect concentration (LOEC) for *P. forbesi* of 0.36-mg N/L.

ii. The Permit's Findings Of Chronic Toxicity To Delta Copepods Are Based On Improper ACR Analysis And Preliminary Information

The Discharger contends that, "*to find chronic toxicity to Delta copepods, the permit relies on an ACR analysis...*". ACRs or acute-to-chronic ratios are used to estimate chronic (long term) toxicity levels when only acute (short term) toxicity tests are possible with a species. In such situations, the chemical concentration producing an acute response is divided by the ACR value for other similar species to estimate the likely chronic response of the untested organism. Dr. Swee Teh did not use an ACR analysis to establish the ammonia LOEC for *P. forbesi*. The laboratory conducted a full life-cycle chronic test followed by a series of short term acute tests to confirm the earlier chronic results in establishing the Lowest Observed Effect Concentration (LOEC) of 0.36 mg N/L. No other species were used in the toxicological analysis.

The Discharger also lists several other reasons the *P. forbesi* chronic toxicity LOEC should not be used:

¹³⁵ 10 November 2010 letter from Dr. Swee Teh to Chris Foe (SRCSD_CORR_1061)

- **The LOEC is not the EC₂₀ used to develop USEPA water quality criteria.**

The Central Valley Water Board believes this argument is misplaced. In this case the LOEC was used to determine whether aquatic life beneficial use impairments were occurring in the Sacramento River. The permit did not use the LOEC to establish the permit limit.

- **The lab work has not been peer reviewed.**

Although the lab work has not been peer reviewed, this is not a sufficient basis for excluding its consideration. The study was commissioned after comments were received at the fall 2009 Ammonia Summit that USEPA ammonia criteria might not be protective of freshwater copepods and that part of the reason for the collapse of native fish in the Delta might be because their young were having trouble finding food. *P. forbesi* is an important prey item for both larval delta smelt and longfin smelt, two listed species.

Furthermore, the work was done by Dr. Swee Teh, a nationally recognized aquatic toxicologist at the University of California School of Veterinary Medicine in Davis. Dr. Teh has authored or co-authored 55 peer reviewed publications. The study plan was reviewed by the ammonia subcommittee of the IEP Contaminant Work Team and followed US-EPA standard toxicity testing procedures (EPA-821-R-02-012; EPA-821-R-02-013) as much as possible. Results of the full life-cycle test were reviewed by the IEP Contaminant Work Team at a July 2010 meeting. The District was present at the meeting and afterwards requested and received a copy of the Power Point presentation.

Finally, the laboratory results were also periodically reviewed by the Central Valley Water Board contract manager.¹³⁶ A draft final report for all the work has now been prepared and submitted to the IEP Contaminant Work Team for their comment and review. Dr. Teh is also preparing a paper for submission to a peer reviewed journal.

- **There are irregularities in the test results, which have not been explained. A dose response was not observed in the chronic test based on the number of nauplii surviving to adulthood.**

The Central Valley Water Board believes these claims are false. Results of the 31 day full life cycle test are summarized in Table 11 of Dr. Swee Teh's report. Table 11 shows the number of nauplii, juveniles and adults produced per female as a function of increasing total ammonia concentration. As noted by Dr. Teh, "There is a dose response relationship of ammonia exposure and the number of nauplii, juveniles and adult *P. forbesi* produced (Table 11)". More importantly, a retest of the

¹³⁶ Dr. Chris Foe testimony, Hearing Transcript page 410-411. (SRCSD_BM_13)

most sensitive life stage in the 31 day full life-cycle test confirmed the original 0.36-mg N/L LOEC value.¹³⁷

- **The tests were conducted with a novel organism that has no established protocols or comparable results.**

Although it is true that little aquatic toxicity testing has occurred with the copepod, the Central Valley Water Board notes that the copepod is one of the two most important food organisms in the freshwater Delta for larval fish. As such, its response is very ecologically relevant. The Teh laboratory has had *P. forbesi* under culture for several years and control survival during the toxicological testing was acceptable. The best professional judgment of Central Valley Water Board staff is that the results are ecologically relevant and repeatable by another laboratory with aquatic toxicology experience.

iii. The effect levels from preliminary studies are inappropriate water quality criteria

The Discharger contends that, "*Dr. Teh's preliminary studies are unlawful under state and federal regulations for interpreting narrative criteria...the Regional Board must use a calculated numeric water quality criteria...*" As noted previously the Basin Plan for the Central Valley Region, states that "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life...Compliance with this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests of appropriate duration or other methods as specified by the Regional Water Board*". The study results are summarized in Appendix J of the Adopted Permit and are presented as evidence of in-stream toxicity and a violation of the narrative toxicity objective. They were not used to calculate a permit limit.

iv. The State Board Should Strike Objected-To Hearsay Evidence That Was The Basis Of A Finding, And The Finding Relying On That Hearsay Evidence

The District seeks to strike a 10 November 2010 letter from Dr. Teh as hearsay. The transcript of the hearing makes clear that the additional data relied upon as a basis for the conclusions in Dr. Teh's letter were already part of the Central Valley Water Board's record. Furthermore, Dr. Foe testified at the hearing that he went to the lab, looked at the test methods, and reviewed the actual data. (Transcript pp. 407-411.) Consequently, even if it could be argued that Dr. Teh's November 2010 letter is hearsay, it should not be excluded pursuant to Government Code section 11513 because there is other

¹³⁷ Dr. Swee Teh: Full Life-Cycle Bioassay Approach to Assess Chronic Exposure of *Pseudodiaptomus forbesi* to Ammonia/Ammonium, slides 15-17 (SRCSD_OTHER_297)

corroborating evidence in the record, including, but not limited to, Dr. Foe's testimony.

c. The Findings Regarding Inhibition Of Diatom Primary Production Are Not Supported By The Evidence In The Record

Phytoplankton are an essential element of aquatic ecosystems because they trap energy from the sun and convert it into sugars, carbohydrates and other high energy compounds that fuel the remainder of the food chain. Phytoplankton primary production rates in other estuaries have been correlated with fish production.¹³⁸ The Sacramento-San Joaquin Delta Estuary has one of the lowest primary production rates of any major estuary in the world¹³⁹ and its primary production rate has undergone a long term decline. Lack of primary production is one factor hypothesized to explain the low fish production now occurring in the estuary and may also contribute to the Pelagic Organism Decline.¹⁴⁰

Recent studies by the Dugdale laboratory at the Romberg Tiburon Center have demonstrated that ammonia concentrations in the Delta and in Suisun Bay are sufficiently elevated to suppress nitrogen uptake by diatoms.¹⁴¹ The lack of available intracellular nitrogen for protein synthesis is the underlying physiological mechanism responsible for inhibiting algal growth. Field and laboratory results for Suisun Bay have been summarized in a set of peer reviewed journal articles. In these studies ammonia concentrations begin to suppress nitrate assimilation at 0.014-mg N/L and complete shutdown occurs at 0.056-mg N/L. To date ammonia inhibition of nitrogen uptake at similar concentrations has been observed everywhere investigated in the Bay-Delta system.

The San Francisco Bay Regional Water Quality Control Board (San Francisco Water Board) is responsible for regulating water quality in Suisun Bay. The Executive Officer from the San Francisco Water Board found these results persuasive and informed staff from the Central Valley Water Board that ammonia levels in Suisun Bay may be impairing aquatic life beneficial uses by having a detrimental effect on primary production and algal species composition and requested that all reasonable and feasible measures to reduce ammonia loads be taken as soon as possible.¹⁴² Staff from the San Francisco Water Board followed up on their letter and monitored ammonia and chlorophyll concentrations and algal species composition in Suisun Bay. Two diatom blooms (>30 µg/l chlorophyll) were observed in the Bay in the spring of 2010.

¹³⁸ Nixon, S.W., "Nutrient dynamics, primary production and fisheries yields of lagoons", *Oceanologica Acta*, 1982 (SRCSD_OTHER_324)

¹³⁹ See Transcript at p. 126. (SRCSD_BM_13)

¹⁴⁰ American Fisheries Society: Collapse of San Francisco Bay Pelagic Fishes (SRCSD_OTHER_364)

¹⁴¹ Wilkerson, F.R., Dugdale, V. Hogue, and A. Marchi, 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. *Estuaries and Coasts* 29(3): 401-416. (SRCSD_OTHER_367)

¹⁴¹ Dugdale, R. F. Wilerson, V. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring Bloom development in San Francisco Bay. *Estuarine, Coastal and Shelf Science*, 73:17-29. (SRCSD_OTHER_366)

¹⁴² 4 June 2010 letter from San Francisco Bay Region to Central Valley Water Board regarding comments on "Issue Paper- Aquatic Life and Wildlife Preservation Related Issues (SRCSD_CORR_0560)

Both occurred when ammonia concentrations were below 0.056 mg-N/L. At all other times ammonia was above concentrations reported to inhibit algal production and no blooms were observed. These new unpublished results were reported for the first time in an oral present at the 27-29 September 2010, Bay-Delta Science Conference.¹⁴³ The findings, while not yet published, are consistent with previous predictions from the Dugdale and Wilkerson published papers.¹⁴⁴

Evidence for ammonia impairment of algal primary production in the Delta upstream of Suisun Bay was also reported for the first time at the 6th Biennial Bay-Delta Science Conference.¹⁴⁵ These results are consistent with the earlier observations for Suisun Bay that ammonia concentrations suppress algal primary production and standing chlorophyll levels and extend the findings to the freshwater Delta between Rio Vista and Suisun Bay. The results have not yet been published in a peer-reviewed journal.

As previously noted, the Dugdale laboratory reported that ammonia begins to suppress nitrate assimilation and primary production at 0.014 mg-N/L with complete shutdown by 0.056 mg-N/L. Central Valley Water Board staff monitored ammonia concentrations monthly at Chipps Island, about 2 miles upstream of Suisun Bay, and at multiple locations in the Delta for a year between March 2009 and February 2010.¹⁴⁶ Ambient ammonia concentrations in 2009 and 2010 would need to be reduced by a factor of 2 to 7 at Chipps Island and by a factor of 1 to 21 in the main channel of the Sacramento River between Rio Vista and Chipps Island to eliminate the suppression of nitrogen uptake and primary production (see table below). For comparison, the proposed ammonia permit limits would reduce the maximum daily concentration 20-fold (45 to 2.2 mg N/L) and the average monthly value 13-fold (24 to 1.8 mg N/L).¹⁴⁷ These values are comparable to the decreases needed for the Delta and for Suisun Bay to eliminate the ammonia impairment to the phytoplankton community.

¹⁴³ Machi, A. 2010. Spring 2010 Phytoplankton Blooms in Northern San Francisco Estuary: Influences of Climate and Nutrients. Presented at the 6th Biennial Bay-Delta Science Conference held in Sacramento California on 27-29 September 2010 (SRCSD_OTHER_235)

¹⁴⁴ Wilkerson, F., R. Dugdale, V. Hogue and A. Marchi, 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. *Estuaries and Coasts* 29(3):401-416. (SRCSD_OTHER_367) & Dugdale R., F Wilkerson, V. Hogue and A. Marchi. 2007. The role of ammonium and nitrate in spring bloom development in San Francisco Bay. *Estuarine, Coastal and Shelf Science*, 73:17-29. (SRCSD_OTHER_366)

¹⁴⁵ A. Parker, R. Dugdale, F. Wilkerson, A. Marchi, 2010. Biogeochemical Processing of Anthropogenic Ammonium in the Sacramento River and the northern San Francisco Estuary: Consequences for Pelagic Organism Decline Species. Presented at the 6th Biennial Bay-Delta Science Conference held in Sacramento California on 27-29 September 2010 (SRCSD_OTHER_235)

¹⁴⁶ Foe, C., A Ballard, and S. Fong, 2010. Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta, Regional Board report, 87 p (SRCSD_OTHER_157)

¹⁴⁷ Response to Comments, Table 1, page 18.

Diatom Inhibition in Sacramento River

Organism	Location	NH ₃ Effect (mg N/L)	Ambient NH ₃ (mg N/L) ^{1/}		Exceedance Factor ^{2/}		Reference
			Max	Mean	Max	Mean	
Diatoms	Sacramento R @ Chipps Island	Reduces nitrate uptake ^{3/}	0.16	0.10	11X	7X	Dugdale <i>et al.</i> , 2007; Wilkerson <i>et al.</i> , 2006
		Shutdown nitrate uptake ^{4/}	0.16	0.10	3X	2X	
Diatoms	Sacramento R between RioVista & Point Sacramento	Reduces nitrate uptake ^{3/}	0.01- 0.32	0.08- 0.19	1-21X	5X-13X	
		Shutdown nitrate uptake ^{4/}	0.01- 0.32	0.08- 0.19	1-6X	1-3X	

^{1/} The maximum and mean ambient ammonia concentration is the highest monthly and annual average value measured at the site between March 2009 and February 2010 by Central Valley Water Board staff (Foe *et al.*, 2010) (SRCSD_OTHER_157)

^{2/} Calculated by dividing the measured ambient ammonia concentration by the reported effect level

^{3/} 0.015 mg N/L

^{4/} 0.056 mg N/L

Appendix J of the Adopted Permit explains that elevated ammonia levels are not the only factor controlling primary production rates in the Bay-Delta. High turbidity and filtration rates by the introduced clam *Corbula amurensis* are also important. Figure 5 in the Discharger's petition is a good example of the importance of these other factors. An algal bloom occurred on only two of the five occasions when ammonia levels fell below inhibiting concentrations in Suisun Bay. Presumably other unidentified factors controlled primary production on the three other occasions. Equally important, and not mentioned by the Discharger, is the fact that during the three years of study no algal bloom ever occurred when concentrations were greater than the limiting ammonia concentration of 0.056-mg N/L. This demonstrates that there are multiple factors controlling algal blooms with ammonia being only one of them. Nonetheless, no blooms will ever occur if ammonia concentrations remain as high as they are most of the time now in the Bay-Delta.

A second example was noted in Appendix J of a situation where elevated ammonia concentrations did not inhibit algal production. Ammonia concentrations are higher in the Sacramento River below the SRWTP than in Suisun Bay. Elevated ammonia levels still suppressed nitrogen uptake but did not consistently reduce primary production.¹⁴⁸ It's inferred that the different results may be caused by the fact that another type of algae are growing in the freshwater Sacramento River than further downstream in the more saline Delta and Suisun Bay. Water samples were taken for algal enumeration and identification but have not been processed. Regardless, the different results for the freshwater Sacramento River do not invalidate the results consistently being

¹⁴⁸ A. Parker, A. Machi, J. Davidson-Drexel, R. Dugdale, and F. Wilkerson. 2010. Effect of ammonium and wastewater effluent on riverine phytoplankton in the Sacramento River, CA. Final report to the State Water Resources Control Board, (SRCSD_OTHER_160)

observed in the more brackish delta and Suisun Bay by both the Dugdale laboratory and the San Francisco Water Board.

In summary, evidence was presented in Appendix J that ammonia from the SRWTP is having a negative effect on algal primary production in both Suisun Bay and in the Delta. Like with toxicity to the copepod *P. forbesi*, suppression of nitrate uptake in diatoms is a violation of the Narrative Toxicity Objective and is evidence that ammonia from the Discharge is causing beneficial use impairments downstream. The ammonia limits in the Adopted Permit were developed to meet the 1999 USEPA chronic ammonia criterion at the end of the pipe and were not based on concentrations that would protect diatoms. Nonetheless, it was recognized that substantial ammonia reductions were needed to protect diatom growth, and that the proposed 1999 USEPA criteria based limits are sufficiently low to protect the diatom community in both Suisun Bay and in the Delta.

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

(a) Ammonia Concentrations Above the Threshold of 0.056-mg N/L Have Been Shown to Stimulate Growth of N-Limited Phytoplankton as They Enter the Delta in the Sacramento River

The Central Valley Water Board agrees with the Discharger that ammonia concentrations greater than the threshold of 0.056-mg N/L do not appear to reduce primary production in the freshwater Sacramento River near the discharge. This was noted in Appendix J of the Adopted Permit and was not the basis for denying an ammonia mixing zone.

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

Again, the Central Valley Water Board agrees with the Discharger that ammonia concentrations do not appear to reduce primary production rates in the Sacramento River near the discharge. Also, there is no evidence that ammonia concentrations are changing phytoplankton community composition near the discharge point. Water samples were taken from above and below the discharge by Dr. Alex Parker and archived for phytoplankton identification. No phycologist could be found to identify them. Instead, algal cells were size fractionated (less than and greater than 5 microns with the assumption that larger cells were diatoms). No change in the size distribution was noted above and below the SRWTP. However, contrary to assertions of the Discharger, these findings for the freshwater end of the Bay-Delta

cannot be used to invalidate the separate independent findings of Drs. Dugdale and Wilkerson and the San Francisco Water Board for the more saline parts of the Delta and in Suisun Bay. Diatom blooms have only been observed in Suisun Bay when ammonia levels fall below 0.056 mg N/L.

(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)

The Discharger correctly noted in the petition that, "Attachment J to the Permit implies that *Microcystis* blooms "may" be associated with ammonia from the SRWTP". According to Drs. Lehman and Brown the algal community in the Delta has shifted from a diatom to a flagellate/blue green community.¹⁴⁹ Dr. Dugdale hypothesized that flagellates/blue green algae will be competitively superior and come to dominate in an ammonia rich water body. Dr. Cliff Dahm, lead scientist for the Delta Stewardship Council, testified at the Hearing that reducing the ammonia loading to the Delta would also reduce blooms of *Microcystis aeruginosa*, a toxin producing algae.¹⁵⁰ Central Valley Water Board staff listed this hypothesis and another by Dr. Glibbert¹⁵⁰ that the ratio of nitrogen to phosphorus might be responsible for altering the food chain under the heading in Appendix J entitled "Shifts in Algal Communities". Central Valley Water Board Staff went on to acknowledge that in their best professional judgment the cause of the shift in the algal community was not known at present. The Central Valley Water Board did not use this as the basis to reduce SRWTP ammonia loadings.

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

As noted above, the Central Valley Water Board did not base their permit requirement to reduce SRWTP ammonia loadings based upon the hypothesis that either ammonia or nitrogen to phosphorus ratios might be inducing blue-green algal blooms.

¹⁴⁹ Lehman, P. 1998. Phytoplankton species composition, size structure, and biomass and their possible effect on copepod food availability in the low salinity zone of the San Francisco Bay/Delta and Suisun Bay. IEP technical report No 62. August 1998. (SRCSD_OTHER_397)

Lehman, P. 2000A The influence of climate on phytoplankton community biomass in San Francisco Bay Estuary. *Limn and Ocean* 45(3):580-590 (SRCSD_OTHER_374)

Lehman, P. 2000B. Phytoplankton biomass, cell diameter, and species composition in the low salinity zone of northern San Francisco Bay Estuary. *Estuaries* 23 (2):216-230. (SRCSD_OTHER_375)

Brown, T. 2010. Phytoplankton community composition: the rise of the flagellates. IEP Newsletter. (SRCSD_OTHER_362)

¹⁵⁰ P. Glibbert, 2010. Long-term changes in nutrient loading and stoichiometry and their relationships with change in the foodweb and dominant pelagic fish species in the San Francisco Estuary, California. Review in Fisheries Science (accepted). (SRCSD_OTHER_259)

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

Again, the Central Valley Water Board did not base their permit requirement to reduce SRWTP ammonia loads on upon observed shifts in algal species composition.

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

As noted previously, the Central Valley Water Board did not base their permit requirement to reduce SRWTP ammonia loads based upon observed shifts in algal species composition. Nonetheless, the suppression of diatom blooms, the dominant historic algal species in the Delta, is a violation of the Narrative Toxicity Objective and a beneficial use impairment whether or not this leads to the proliferation of other algal species or not.

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

The Discharger contends that ammonia inhibition cannot be the basis for water quality criteria because the results are not an adopted regulation or State policy. The Central Valley Water Board did not use the threshold values that elicited ammonia inhibition as water quality criteria, but as evidence of a violation of the Narrative Toxicity Objective and of a downstream beneficial use impairment. The ammonia effluent limits were based upon USEPA 1999 criteria but are sufficiently low to protect all known downstream beneficial uses.

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

a. Department of Water Resources (DWR) Hood Data is Unreliable and Should Not Be Relied Upon

The Central Valley Water Board does not accept all the conclusions of the Discharger's Low Dissolved Oxygen Prevention Assessment (LDOPA). The LDOPA study was reviewed by modeling experts with PG Environmental, a USEPA contractor, on behalf of the Central Valley Water Board. The contracting experts confirmed that the model used for the LDOPA was technically sound. Central Valley Water Board concurs that the modeling is technically sound. However, the Central Valley Water Board's concern is regarding the dissolved oxygen data used to calibrate and validate the model. The LDOPA concludes that at current discharge rates the Facility is not causing dissolved oxygen in the Delta to drop below the Basin Plan objective. However, dissolved oxygen

ambient monitoring data downstream of the Facility discharge demonstrates that at times the Sacramento River is not in compliance with the Basin Plan objective. Therefore, the Central Valley Water Board does not find that, at current discharge rates, the Facility is not causing exceedances of the Basin Plan objective.

The Department of Water Resources (DWR) maintains several water quality databases for monitoring locations in the Delta. DWR operates a water quality monitoring station downstream of the discharge at Hood (eight miles below the SRWTP discharge). DWR conducts continuous monitoring for dissolved oxygen on 15 minute intervals at the Hood station. The station is checked every two weeks for accuracy and is calibrated, as needed. Since 2008, at times the dissolved oxygen concentrations have been recorded below 7.0 mg/L at the Hood monitoring station. The Municipal Water Quality Investigations (MWQI), a separate unit at DWR, also collects discrete dissolved oxygen water quality data at Hood. The MWQI database also shows dissolved oxygen concentrations below 7.0 mg/L. Furthermore, Central Valley Water Board staff conducted a nutrient study for the last year and also recorded dissolved oxygen concentrations below 7.0 mg/L at several locations downstream of the Facility discharge, including at the Hood monitoring location. Overall, data shows that the dissolved oxygen concentrations in the Sacramento River upstream of the Facility's discharge are always in compliance with the objective, however, this is not the case downstream of the discharge.

At the request of Central Valley Water Board staff, the DWR completed a Quality Assurance/Quality Control review of the California Data Exchange Center (CDEC) data at Hood for dissolved oxygen. DWR's results are presented in a 22 July 2010 memo from Sal Batmanghilich to Kathleen Harder.¹⁵¹ Out of 610 days of data only 6 days needed correction (less than 1%). Out of the 6 corrections, 4 corrections resulted in the lowering of the recorded dissolved oxygen concentration data, not increasing it as the Discharger claims.

Dr. Chris Foe, Central Valley Water Board staff scientist, compared his dissolved oxygen data to the Department of Water Resources CDEC data in the July 2010 *Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta* report on page 15. He concluded, "The difference in dissolved oxygen (DO) values ranged between 0.4 and 0.7 mg/l. A significant amount of bias was again observed at Rio Vista where the CDEC probe consistently recorded higher values than measured in this study." In other words, the CDEC data may be too high. With the Discharger's data higher than CDEC's data, the Central Valley Water Board concluded that the Discharger's assessment shows an upward bias. This was also DWR's conclusion in its 17 June 2010, memorandum to Kathy Harder from Gerald E. Johns which states:

"DWR recently found that Discharger measurements of DO concentrations in the Sacramento River near Freeport California tended to be higher than

¹⁵¹ 22 July 2010 Memo from Department of Water Resources to Central Valley Water Board staff regarding Hood water quality station DO (SRCSD_CORR_0643)

Central Valley Regional Board's; and DWR's DO levels measured downstream of the Discharger's discharge. It is unclear whether this difference is due to the calibration or malfunction of Discharger's monitoring equipment. If there was a problem with the DO measurements exceeding permitted levels, additional discharge may result in additional exceedances of regulated DO levels. It could be helpful to examine a longer record of Discharger Quality Assurance/Quality Control records during periods when DO levels were near compliance levels to determine if actual values may have exceeded permitted levels. This could be useful in developing more reliable projections of possible DO levels under future scenarios."

DWR reviewed one of the Discharger's calibration worksheets developed by the company that manufactures water quality instrument probes (YSI Calibration Worksheets) for its dissolved oxygen meter and found some results to be outside the accepted range. For example the dissolved oxygen charge value was reported as "98" and the gain was "1.21". DWR states that these calibration results will result in higher than actual values in the field when compared to Winkler titrations.¹⁵²

The Discharger compiled a list of dissolved oxygen concentration data for the Sacramento River downstream of the discharge.¹⁵³ The locations surveyed were Freeport, Hood and Rio Vista. The agencies collecting the data included the Central Valley Water Board (Regional Board Hood), United States Geological Service (USGS at Freeport, Greens' Landing (Hood) and Rio Vista, DWR (CDEC at Hood and Rio Vista), City of Rio Vista (at Rio Vista), the Interagency Ecological Program (EMP at Hood) and the Discharger (District Freeport, CMP at Freeport, CMP at RM44). All agencies except the Discharger recorded dissolved oxygen concentrations less than 7.0 mg/L. Additionally, the Municipal Water Quality Investigations (MWQI) dissolved oxygen concentration data is collected monthly at Hood. The database (excluded from the Discharger's compilation of dissolved oxygen data) shows discrete samples less than 7.0 mg/L.¹⁵⁴

The Discharger continues to reference PG Environmental's evaluation of the LDOPA and dissolved oxygen concentrations in the CDEC database for Hood. PG Environmental was asked by the Central Valley Water Board staff to evaluate the LDOPA model. In their 29 June 2010 memo, PG Environmental concluded the following:

"The actual calibration exercise focused on daily averages extracted from continuous DO measurements obtained during 2008. Unfortunately, the DO data obtained at Hood during most of 2008 may be incorrect. It is suggested that these data need to be adjusted upward by 1.5 mg/L between February and December 2008, but that the situation is still under investigation and

¹⁵² Email from Mike Dempsey, DWR to Rich Breuer and Sal Batmanghlich, DWR dated 17 February 2010. (SRCSD_CORR_2071)

¹⁵³ Copy of DO_Memo_Appendix_C_Data (SRCSD_DATA_024)

¹⁵⁴ Website located at:

http://www.water.ca.gov/waterdata/library/waterquality/station_county/select_station.cfm?URLStation=C3A&source

additional corrections may be needed. Interestingly, the proposed correction essentially forces the data to saturation concentrations throughout the summer. In any case, the data at Hood do not appear usable for calibration at this time."

This assessment by PG Environmental was based on Figure 53, DWR Continuous Dissolve Oxygen Measurements at Hood, Appendix A of the May 2010 LDOPA. PG Environmental did not review any dissolved oxygen concentration data as supported by its statement in the 29 June 2010 memo. "Continuous DO measurements were not available for validation," PG Environmental never reviewed the QA/QC data from DWR.¹⁵⁵ Additionally, PG Environmental concluded the plots suggest that the model could have some upward bias: the winter peaks estimated by the model are usually greater than the observed data, while the warm-season minima in the observation series are consistently lower than the model, particularly at Rio Vista.

The Discharger contends that the DWR data is not accurate and so the Discharger did not use the data to calibrate or validate the model. The Central Valley Water Board did not concur. Consistent with the development of other NPDES permits, data is only discarded from use if certified information from a laboratory, or other quality assurance/quality control (QA/QC) is made available to demonstrate that the data is not representative of the water sample. There is not sufficient evidence for the Central Valley Water Board to discard the DWR data. The DWR data was and is collected under rigorous QA/QC procedures and the data is not only used by DWR, but by many if not most of the scientific studies conducted on the Delta by various organizations and universities.¹⁵⁶

b. Full Nitrification Is Unrelated to Compliance With Dissolved Oxygen Objective

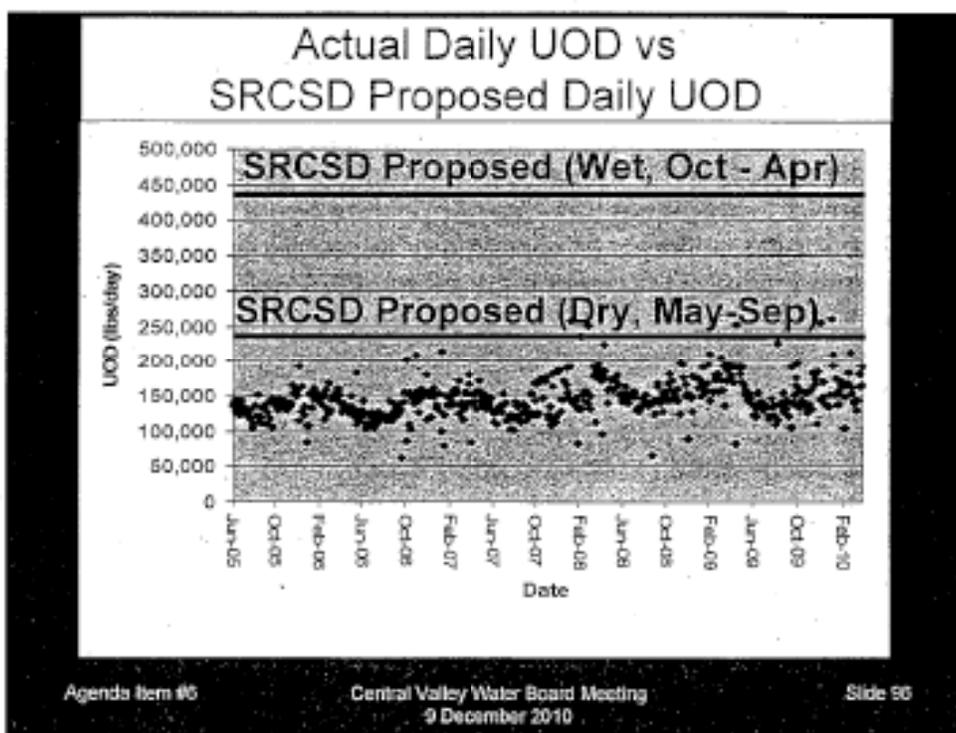
As ammonia is consumed by organisms in the natural environment of our surface waters it is oxidized to nitrite and nitrate. This oxidation process consumes dissolved oxygen in the surface water, thus creating an oxygen demand on the water body. For every pound of ammonia oxidized to nitrate, 4.18 pounds of oxygen are consumed.¹⁵⁷ Therefore, about 58 tons of dissolved oxygen in the Sacramento River is needed daily to fully oxidize the average 14 tons ammonia discharged by the District. If the oxygen consumption rate exceeds the oxygen production of the water body, oxygen levels can drop below receiving water objectives and adversely affect aquatic life beneficial uses. The Basin Plan objective for dissolved oxygen concentration in the Sacramento River,

¹⁵⁵ 22 July 2010 N=Memo from Department of Water Resources to Central Valley Water Board staff regarding Hood water quality station DO (SRCSD_CORR_0643)

¹⁵⁶ When pressed on the issue at the hearing, the District's witness, Mr. Mysliwiec, never specifically stated that the data, in this case the exclusion of 12,000 data points, should be omitted. What he stated is "that is an anomaly yet to be resolved" based on the fact that the particular model he used did not match the data from Hood. (Transcript at p. 237.) Just because his particular model did not match the data from Hood is not a sufficient basis to say that the data should be thrown out or is otherwise unreliable. (SRCSD_BM_13)

¹⁵⁷ Nitrification and Denitrification, (SRCSD_OTHER_399)

downstream of the discharge, is 7.0 mg/L. Based on information in the record, the Facility's discharge currently is discharging ammonia at levels that cause violations of the water quality objective for dissolved oxygen. As discussed above in response to Statement of Points and Authorities Section VI.A.2, the Discharger's proposed mixing zone for ammonia would result in water quality based effluent limitations that require no reduction in the current loading of ammonia to the Sacramento River. The Discharger requested that Central Valley Water Board staff add additional Ultimate Oxygen Demand (UOD) effluent limits to the permit that were intended to address the dissolved oxygen issue. However, as shown in Slide number 96 of the Central Valley Water Board staff public hearing presentation, the proposed UOD limits would have resulted in the same or greater ammonia loading to the Delta that is currently occurring, regardless of the Discharger's statements that the new requirements would require the ammonia to be reduced by about half.



Agenda Item #6

Central Valley Water Board Meeting
9 December 2010

Slide 96

The two red lines in the hearing presentation slide above illustrate the Discharger's requested effluent limits for the UOD. As shown in the slide above, the requested limits actually allow the UOD, mostly ammonia, to increase from about 14 tons/day to 16 tons/day during the dry weather season and up to 27 tons/day during the wet season. The Discharger did not dispute these facts at the hearing.

The requested mixing zone, which is based on the USEPA ammonia criteria, would result in dissolved oxygen impacts in the receiving water beyond the proposed mixing zone boundaries. The Facility's discharge places an oxygen demand on the receiving water, which in turn impacts the dissolved oxygen of the Sacramento River for 35 miles downstream. The requested mixing zone would have compromised the integrity of the entire waterbody, thus violating the Basin

Plan and the SIP's mixing zone requirements. The Discharger requested Ultimate Oxygen Demand (UOD) effluent limits to address the dissolved oxygen depletion issues. However, as discussed in 2a, above, Central Valley Water Board did not agree with the conclusion of the Discharger's Low Dissolved Oxygen Prevention Assessment study that was used to establish the requested UOD limits.

The Discharger is correct that effluent limits for ammonia to address the dissolved oxygen depletion could be developed. However, low dissolved oxygen does not control the establishment of effluent limits for ammonia. The Adopted Permit does not allow for ammonia mixing zones because the requested mixing zones did not meet the SIP's mixing zone requirements. The final effluent limitations for ammonia were therefore established based on the most stringent water quality criteria, in accordance with USEPA and the SIP. The USEPA TSD states, "In 1980, EPA emphasized in its preamble to NPDES regulations (45 FR 33520) that NPDES permit limitations must reflect the most stringent of technology-based, water quality-based controls, or other standards required by the CWA ..."¹⁵⁸ Also, the SIP also states in 1.3 – Determination of Priority Pollutants Requiring Water Quality-Based Effluent Limitations, Step1: "Identify applicable water quality criteria and objectives for priority pollutants as described in section 1.1. Determine the lowest (most stringent) water quality criterion or objective for the pollutant applicable to the receiving water (C)"¹⁵⁹ The lowest water quality criteria for ammonia are the USEPA 1999 Aquatic Life Ambient Water Quality Criteria for Ammonia Update which was used to determine the ammonia effluent limits as end-of-pipe effluent limits, since mixing zones for ammonia were not allowed. Additional effluent limits could be developed to address the dissolved oxygen issue, however they would be less stringent than the limits established in the Adopted Permit.

3. The Presence of Nitrosodimethylamines, a Nitrosoamine, Is an Improper Basis to Deny Ammonia Mixing Zones or Find That Full Nitrification Is Required

The Central Valley Water Board staff acknowledged N-nitrosodimethylamine (NDMA) is not a primary MCL, but a California Toxic Rule (CTR) constituent. This was corrected throughout the tentative permit and Appendix J prior to adoption, except on pages 57 and J-11. The finding should be corrected as follows in underline/strikeout format:

"Specifically, the Permit finds that the Discharger's effluent contains nitrosoamines at levels that are greater than 100 times the primary-MCL CTR criterion."

The Fact Sheet on pages 56-57 describes eleven (11) reasons to deny a mixing zone for ammonia. Only one reason is needed for such a denial. Following is a list of those reasons:

¹⁵⁸ USEPA TSD page xxiii

¹⁵⁹ SIP, page 6.

- (1) Recent studies suggest that ammonia at ambient concentrations in the Sacramento River, Delta and Suisun Bay may be acutely toxic to native *Pseudodiaptomus forbesi* (copepod).¹⁶⁰
- (2) A consensus of scientific experts concluded the SRWTP is a major source of ammonia to the Delta.¹⁶¹
- (3) Recent studies provide evidence that ammonia from the SRWTP discharge is contributing to the inhibition nitrogen uptake by diatoms in Suisun Bay.¹⁶²
- (4) Ammonia along with the clam, *Corbula* and high turbidity are attributed to reducing diatom production and standing biomass in the Suisun Bay.¹⁶³
- (5) Downstream of the discharge point, ammonia may be a cause in the shift of the aquatic community from diatoms to smaller phytoplankton species that are less desirable as food species.¹⁶⁴
- (6) Regardless of whether ammonia is directly or indirectly contributing to the POD, ammonia is shown to affect adult *Pseudodiaptomus forbesi* reproduction at concentrations greater than or equal to 0.79 mg/L. And nauplii and juvenile *Pseudodiaptomus forbesi* are affected at ammonia concentrations greater to or equal 0.36 mg/L. These ammonia concentrations can be found downstream of the discharge. The beneficial use protection extends to all aquatic life and is not limited to pelagic organisms.¹⁶⁵
- (7) USEPA expects to publish the 2009 Ammonia Criteria Update which includes more stringent ammonia criteria for freshwater mussels compared with criteria for salmonids in early 2011.^{166,167} Freshwater mussels reside in the Upper Sacramento River above and likely below the SRWTP discharge.
- (8) The Discharger's effluent contains ammonia and BOD at levels that use all the assimilative capacity for oxygen demanding substances in the Sacramento-San Joaquin Delta. This results in no assimilative capacity for other cities and communities to discharge oxygen demanding constituents, which is needed for them to grow despite the fact that most of these cities and communities are

¹⁶⁰ Teh, S. 2010. Full Life-Cycle Bioassay Approach to Assess Chronic Exposure of *Pseudodiaptomus forbesi* to Ammonia/Ammonium (SRCSD_OTHER_297) and (SRCSD_CORR_1061)

¹⁶¹ Sommer, T., Cl Armor, R. Baxter, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K Souza. 2007. The Collapse of Pelagic Fishes in the Upper San Francisco Estuary. *Fisheries* 32(6):270-277. (SRCSD_OTHER_364)

¹⁶² Parker, Biogeochemical Processing of Anthropogenic Ammonium in the Sacramento River and the Northern San Francisco Estuary – A Summary (SRCSD_OTHER_236 and Parker, A. Biochemical Processing of Anthropogenic Ammonia in River and Estuarine Water Columns. 2010 (SRCSD_OTHER_238)

¹⁶³ Phytoplankton Blooms and Nitrogen Productivity in San Francisco Bay-citations within the article (SRCSD_OTHER_367)

¹⁶⁴ Draft Final Report-Effect of Ammonium and Wastewater Effluent on Riverine Phytoplankton in the Sacramento River, CA., Parker et al. (SRCSD_OTHER_160)

¹⁶⁵ Teh, S. 2010. Full Life-Cycle Bioassay Approach to Assess Chronic Exposure of *Pseudodiaptomus forbesi* to Ammonia/Ammonium (SRCSD_OTHER_297) & (SRCSD_CORR_1061)

¹⁶⁶ USEPA: Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, (SRCSD_OTHER_138)

¹⁶⁷ Personal Communication of Lisa Huff USEPA with Kathy Harder, August 2010. (SRCSD_CORR_2129)

already implementing Best Practical Treatment or Control (BPTC) at their own facilities and the SRWTP is not implementing BPTC.¹⁶⁸

- (9) The Discharger's effluent contains nitrosoamines at levels that are more than 100 times greater than the CTR criterion.¹⁶⁹ Nitrosamines are disinfection byproducts that are created when wastewater effluent contains ammonia and is then disinfected with chlorine, which is the case at the SRWTP.
- (10) The Discharger must fully comply with Resolution No. 68-16 that requires Best Practicable Treatment or Control, which for this discharge includes nitrification and denitrification of their wastewater.¹⁷⁰
- (11) The mixing zone requirements for the SIP are not met for ammonia¹⁷¹:
 - a. Compromise the integrity of the entire water body;
 - b. Adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or state endangered species laws; and
 - c. Produce undesirable or nuisance aquatic life.

Subject to certain exceptions, the Discharger is generally correct that waste discharge requirements may not specify design, location, type of construction, or particular manner in which compliance may be had. However, as stated in the Adopted Permit¹⁷² nitrosoamines are the byproduct of ammonia and chlorine. Although source control and/or elimination of chlorine will reduce NDMA, nitrification will also reduce NDMA.

The California Department of Water Resources (DWR) is currently studying NDMA in the Sacramento-San Joaquin Delta. Preliminary data shows NDMA has not been detected at Hood, eight miles downstream of the discharge on the Sacramento River. However, DWR did find the NDMA precursors significantly greater (3-4 times) below the discharge compared with above the discharge point.¹⁷³ NDMA precursors are a problem for drinking water agencies that disinfect with chlorine. Ammonia must be reduced to eliminate the NDMA precursors.

¹⁶⁸ Email from Mike Dempsey, DWR to Rich Breuer and Sai Batmanghlich, DWR dated 17 February 2010. (SRCSD_CORR_2071) and Copy of DO_Memo_Appendix_C_Data (SRCSD_DATA_024)

¹⁶⁹ Effluent data (SRCSD_DATA_114)

¹⁷⁰ See Section VIII D. 1. BPTC is Not for treatment's Sake

¹⁷¹ See Section VI.

¹⁷² Appendix J of Order No. R5-2010-0114, pages 10 and 11. (SRCSD_CORR_3000)

¹⁷³ "Investigation into the sources of nitrosamines and their precursors in the Sacramento-San Joaquin Delta, California", Carol L. DiGiorgio, California Department of Water Resources, Municipal Water Quality Investigations Unit. Poster presented from 9-11 August 2009. (SRCSD_OTHER_239)

4. Finding for Denial of Mixing Zones and Requirements for Full Nitrification Based on Un-Published Draft U. S. EPA Criteria Are Not Appropriate

The 2009 Draft USEPA ammonia criteria support the non-allowance of mixing zones and dilution for ammonia. The USEPA is on track to publish the 2009 Ammonia Criteria in May 2011.^{174,175} In order for the criteria to be adopted the science must be peer reviewed. The science for protection of freshwater mussels supports more stringent requirements than the existing 1999 USEPA ammonia criteria for salmonids, which has been used to develop the water quality-based effluent limits for ammonia in the Adopted Permit. Although the USEPA states that the new ammonia criteria must be published and adopted by the states to be legally binding and directly used in permits; this is not entirely correct. The Basin Plan includes a narrative toxicity objective which states: "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at III-8.00.) The Basin Plan states that material and relevant information, including numeric criteria, and recommendations from other agencies and scientific literature will be utilized in evaluating compliance with the narrative toxicity objective. Therefore, the Central Valley Water Board used the scientific literature that is the basis of the new USEPA ammonia criteria to interpret the Basin Plan's Narrative Toxicity Objective.

The Discharger contends that regardless of whether the draft ammonia criteria are applicable, ambient concentrations are never exceeded based on the nutrient study conducted by Central Valley Water Board staff. As stated earlier, the nearest collection of nutrient data location to the discharge is eight miles downstream. The Water Agencies analyzed ambient ammonia concentrations at receiving water monitoring location R-3, 4,200 feet downstream of the discharge. Based on this analysis the 2009 ammonia draft criteria would be exceeded 29% of the time in 2008 and 16% of the between January 2007 to April 2010.¹⁷⁶ Since freshwater mussels reside in the Sacramento watershed, consideration of these criteria may be applied to the SRWTP discharge.

5. Full Nitrification Is Not Justified Via State Board Resolution No. 68-16

See response to Statement of Points and Authorities, Section VI.A.2.

VII. THE PERMIT IMPROPERLY INCLUDES FINAL EFFLUENT LIMITATIONS AND DENIES MIXING ZONES FOR NITRATE BASED ON ALLEGED AND UNEXPLAINED FAR FIELD IMPACT

The discharge currently contains very low concentrations of nitrate, because the nitrogen in the wastewater is primarily in the form of ammonia. However, ammonia and other nitrogen compounds will generally oxidize to nitrate in the river. Furthermore, ammonia reduction is

¹⁷⁴ USEPA: Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, (SRCSD_OTHER_138)

¹⁷⁵ Email to Kathleen Harder from Lisa Huff, USEPA dated 23 February 2011.

¹⁷⁶ Water Agencies Comments to Tentative Permit, dated 8 October 2010. (SRCSD_CORR_0995)

required in the Adopted Permit, so nitrate will be formed when the ammonia is oxidized (nitrified). Only reducing ammonia from the discharge will not reduce the total nitrogen load to the Sacramento River and the Sacramento-San Joaquin Delta. The 14 tons of ammonia currently discharged will convert to approximately 14 tons of nitrate (as N) either in the Sacramento River (as currently happens) or in the wastewater treatment plant (after nitrification is implemented).

Nitrate has two primary water quality concerns:

- **Drinking water** – Excessive nitrates in drinking water can harm human fetuses and infants. If most of the ammonia is required to be removed, the resultant effluent will likely contain nitrates in excess of the State Drinking Water Standard (Primary MCL: 10 mg/L nitrate as N). There is sufficient dilution available in the Sacramento River that the river after mixing will not exceed the nitrate drinking water standard.
- **Nutrients** – Nitrogen is an essential nutrient to life. Nitrogen in nitrates is readily available for use by plants. As with ammonia, excessive nitrogen can contribute to excessive or changed growth in a water body, changing the ecology of the water body. Changing the type of nitrogen, increasing the concentration of nitrogen, or changing the nitrogen-to-phosphorus ratio can change the ecology of a waterbody. Several biologic impacts in the Delta and export waters from nitrogen in the discharge have been asserted, but none have been clearly demonstrated. The overall impact of the nitrogen on the Delta is not fully understood, but reduction of nitrogen in the SRWTP discharge will reduce or eliminate the nitrogen-related impacts. Increased nitrogen loads create the following problems:
- Excessive algal growth that increases the total organic carbon which is a precursor for the creation of trihalomethanes (disinfection by product); additionally the algae clogs water treatment filters and cause a nuisance.¹⁷⁷
- Taste and odor in domestic water supply – Dead algae, which results in the measures water districts must take to control algae, creates taste and odor problems in drinking water.¹⁷⁸

Beneficial uses of the Sacramento River and the Sacramento-San Joaquin Delta include municipal and domestic water supply. The Basin Plan includes both numeric and narrative objectives to protect drinking water beneficial uses. The primary maximum contaminant limit (MCL) for nitrate is 10 mg/L (as N). The USEPA Health Advisory for nitrate is 10 mg/L (as N) for exposure 10 days or less. Additionally, the Basin Plan requires:

¹⁷⁷ Summary of Drinking Water Quality Issues and Requested Permit Conditions for the SRWTP NPDES Permit Renewal from Alameda County Water District; Alameda County Flood Control and Water Conservation District, Zone 7; Contra Costa Water District, Metropolitan (SRCSD_OTHER_085)

¹⁷⁸ Summary of Drinking Water Quality Issues and Requested Permit Conditions for the SRWTP NPDES Permit Renewal from Alameda County Water District; Alameda County Flood Control and Water Conservation District, Zone 7; Contra Costa Water District, Metropolitan (SRCSD_OTHER_085)

- Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses. (Basin Plan, page III-3.00)
- Water shall not contain taste or odor producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or fish flesh or other edible products or aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses. (Basin Plan, page III-7.00)

Excessive algal growth in the Delta results in increased concentrations of total organic carbon (TOC). This is in addition to the substantial load of 12 tons of TOC discharged daily by the SRWTP. Elevated total organic carbon negatively impacts municipal drinking water suppliers, because, if the total organic carbon is not removed through prior treatment steps, harmful byproducts may be created during chlorination.¹⁷⁹ High algae levels in source water can also impact water treatment plants, because algae can clog filters and reduce the efficiency of filtration.¹⁸⁰

Some species of bluegreen algae are associated with the production of compounds such as geosmin and 2-methylisoborneol (MIB) that impart objectionable odors and tastes to waters, even at very low concentrations. Taste and odor problems may be resolved with algaecides. But the predominant algaecides are copper-based, which creates solid waste disposal problems, as well as aquatic toxicity issues. Other species of blue green algae, in particular *Anabaena flos-aquae*, *Microcystis aeruginosa*, and *Aphanizomenon flos-aquae*, produce neurotoxins that are toxic to humans, fish, and wildlife.¹⁸¹ These species of algae have also been reported in the Delta according to the Department of Public Health.¹⁸²

Although there are no state or federal numerical standards for nutrients, the USEPA has developed recommended nutrient levels for total nitrogen and total phosphorous that indicate levels of these nutrients that can create a high risk for eutrophication. USEPA's Aggregate Ecoregion 1¹⁸³ that includes the Delta is 0.055 mg/L for total phosphorus and 0.66 mg/L for total nitrogen.¹⁸⁴ These recommended levels generally represent nutrient levels that protect against the adverse effects of nutrient over-enrichment. USEPA has developed these recommendations as starting points for States and authorized Tribes to develop more refined nutrient criteria. At this time there are no state or federal numeric water quality standards for nutrients to limit biostimulation for use in NPDES permitting. The following table compares the USEPA recommended nutrient concentrations and the average and maximum effluent and river concentrations.

¹⁷⁹ TetraTech Report for USEPA: Conceptual Model for Organic Carbon in the Central Valley and Sacramento-San Joaquin Delta, Final Report (SRCSD_OTHER_065)

¹⁸⁰ Summary of Water Quality Issues and Requested Permit Conditions for the SRWTP NPDES Permit Renewal, Dec 2007. (SRCSD_OTHER_085)

¹⁸¹ Summary of Water Quality Issues and Requested Permit Conditions for the SRWTP NPDES Permit Renewal, Dec 2007. (SRCSD_OTHER_085)

¹⁸² <http://www.cdph.ca.gov/HealthInfo/environhealth/water/Pages/Bluegreenalgae> (SRCSD_WEB_08)

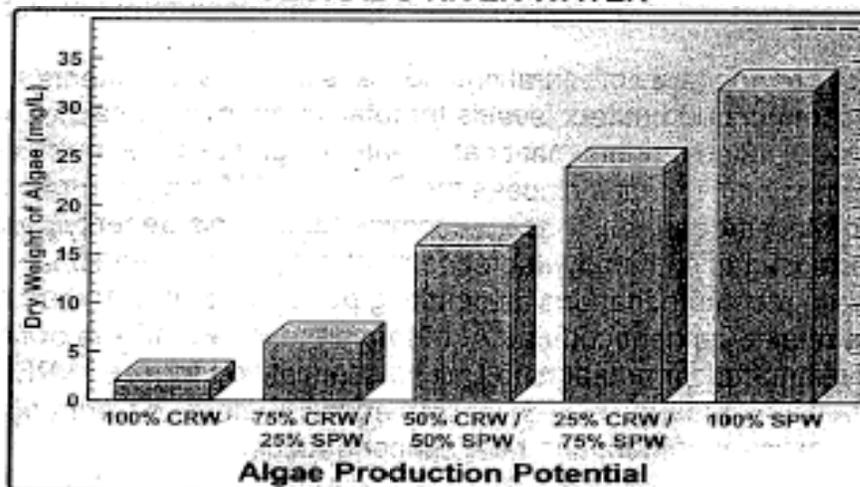
¹⁸³ Ecoregion 1 includes both the Willamette Valley in Oregon and the Central Valley in California.

¹⁸⁴ Nutrient Criteria Development; Notice of Ecoregional Nutrient Criteria, January 6, 2003 (Volume 68, Number 3) (SRCSD_OTHER_398)

Actual and Recommended Nutrient Concentrations: Effluent & Sacramento River

	EPA Recommendation Median	Average Effluent Concentration	Maximum Effluent Concentration	Average Upstream Sacramento River Conc	Maximum Upstream Sacramento River Conc
Total Phosphorus mg/L	0.055	2.3	3.3	0.11	2.8
Total Nitrogen mg/L as N	0.66	24.3	33	0.65	1.4

When evaluating the impact of nutrients on beneficial uses due to eutrophication, nutrient loading is not the only factor to consider. This is because algal productivity depends on several additional factors such as morphology, light availability, flooding frequency, biological community structure, etc. The Delta is light limited, which reduces algal productivity.¹⁸⁵ However, when drinking water agencies transfer Delta water to storage reservoirs or water conveyance facilities (e.g., California Aqueduct) that are not light limited, algal blooms have been known to occur.¹⁸⁶ As an example, the figure below illustrates the dramatic difference between State Water Project and Colorado River water with respect to algal growth.

EFFECT OF STATE PROJECT WATER ON POTENTIAL ALGAL PRODUCTIVITY IN COLORADO RIVER WATER

Source: Metropolitan Water District of Southern California – Water Agencies October 21, 2005 Summary of Drinking Water Quality Issues¹⁸⁷ (SPW=Delta Water; CRW=Colorado River Water)

¹⁸⁵ Summary of Water Quality Issues and Requested Permit Conditions for the SRWTP NPDES Permit Renewal, Dec 2007. (SRCSD_OTHER_085)

¹⁸⁶ Summary of Water Quality Issues and Requested Permit Conditions for the SRWTP NPDES Permit Renewal, Dec 2007. (SRCSD_OTHER_085)

¹⁸⁷ Summary of Water Quality Issues and Requested Permit Conditions for the SRWTP NPDES Permit Renewal, Dec 2007. (SRCSD_OTHER_085)

The primary MCL of 10 mg/L for nitrate is used to determine the average monthly effluent limit. A dilution credit was not allowed, because an average monthly effluent limitation of 10 mg/L is technically achievable, and as discussed below, a mixing zone for nitrate does not meet the SIP's mixing zone requirements. Clearly as described above, nitrate is impacting water bodies downstream of the discharge. Although assimilative capacity and dilution is available in the receiving water for compliance with the primary MCL, a human health mixing zone for nitrate is denied, because due to the nutrient impacts, the mixing zone does not meet the mixing zone requirements of the SIP. The SIP requires, in part, that mixing zones do not;

- (1) Compromise the integrity of the entire water body;

Not only is the Delta impacted by excessive submerged aquatic life¹⁸⁸, but the State Water Project and drinking water reservoirs located as far away as Los Angeles have routinely experienced algae and taste and odor problems.¹⁸⁹

- (2) Adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;

The Discharger's diffuser is located on the bottom of the Sacramento River at Freeport. This area is designated critical habitat for five federally-listed fish species (i.e., Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook salmon (*O. tshawytscha*), California Central Valley steelhead (*O. mykiss*), Southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*), and delta smelt (*Hypomesus transpacificus*) and essential fish habitat (EFH) for Pacific salmon. Additionally, the starry flounder, northern anchovy and English sole also have designated EFH within Suisun Bay which is impacted by the discharge.¹⁹⁰

- (3) Produce undesirable or nuisance aquatic life;

Dr. Cliff Dahm, lead scientist for the Delta Stewardship Council, testified at the 9 December 2010 Central Valley Water Quality Board meeting that reducing the nutrient loading to the Delta will reduce the increased algal blooms of *Microcystis aeruginosa*, a toxin producing algae. The reduced nutrient loading will also reduce the nuisance non-native submerged aquatic vegetation, watercress and *Egeria densa*.¹⁹¹

¹⁸⁸ Central Valley Water Board 12-9-2010 Item Transcript, Dr. Cliff Dahm, page 240. (SRCSD_BM_13)

¹⁸⁹ Summary of Drinking Water Quality Issues and Requested Permit Conditions for the Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal, December 2007, Declarations from Leah Orloff, Douglas G. Chun, G.F Duerig, Bruce Cabral and Mic Steward representing Water Agencies. (SRCSD_OTHER_023)

¹⁹⁰ United States Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service letter transmitted October 13, 2010 to James Marshall, CVRWQCB. (SRCSD_CORR_2126)

¹⁹¹ Central Valley Water Board 12-9-2010 Item Transcript, page 240. (SRCSD_BM_13)

The allowance of a human health mixing zone for nitrate does not meet these requirements because elevated nitrogen discharges from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta, not just the areas defined by the requested mixing zone. The allowance of the requested mixing zone for nitrate would compromise the integrity of the entire water body, adversely impact biologically sensitive or critical habitats, and produce undesirable or nuisance aquatic life.

Information on the reasons for the nitrate limitation and denial of a human health mixing zone as described above are in the administrative record, including the Staff Report, Response to Comments and the Central Valley Water Board staff presentation at the 9 December 2010 Board Hearing.

VIII. THE REGIONAL BOARD MISAPPLIED AND MISINTERPRETED ANTIDegradation POLICIES CONTRARY TO LAW AND STATE POLICY

The Central Valley Water Board believes that a new anti-degradation analysis was warranted based on substantive new information since adoption of the previous permit in the year 2000, and that the District's discharge is adversely affecting one or more beneficial uses. Consequently, an anti-degradation analysis was warranted to help develop waste discharge requirements that ensure that there will not be an adverse effect on one or more beneficial uses and a pollution or nuisance will not occur. Given the existing state of the science developed over the last ten years, the Central Valley Water Board believes that the failure to make the necessary anti-degradation findings would essentially have resulted in a permit that would have allowed the District to continue to adversely affect one or more beneficial uses. The Central Valley Water Board does not renew a permit concerning a particular discharge, whether "existing" or not, that adversely affects one or more beneficial uses and certainly not without appropriate anti-degradation findings to ensure that the permit complies with the state and federal anti-degradation policies.

Adopting the District's logic would essentially mean that the Central Valley Water Board should be renewing a permit with limited or even no anti-degradation findings when there is demonstrated evidence that the District's discharge adversely affects one or more beneficial uses. This logic is flawed and is contrary to State Water Board Resolution 68-16 which requires that any permitted discharge not result in a violation of water quality objectives, not adversely affect one or more beneficial uses, and not result in a condition of pollution or nuisance. It is also contrary to the Water Code's mandate that no discharge of waste into the waters of the state shall create a vested right to continue the discharge and that all discharges of waste into waters of the state are privileges, not rights. This is the case, regardless of whether the discharge is made pursuant to waste discharge requirements. (Water Code section 13263, subdivision (g).)

A. Renewal of the District's Permit Did Not Trigger State or Federal Antidegradation Review

1. State Anti-Degradation Review:

a. State Water Board Resolution No. 68-16

The first paragraph of State Water Board Resolution No. 68-16 states that "Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies."

Here, no one appears to be debating the question of whether the existing quality of water is better than the quality established in policies as of the date on which such policies became effective. A key disagreement concerns what constitutes "maximum benefit to the people of the State" and whether the proposed discharge will or will not "unreasonably affect present and anticipated beneficial use of such water."

First of all, as mentioned in Resolution 68-16, consideration of maximum benefit and not unreasonably affecting present and anticipated beneficial use of such water is premised on "any change" to existing high quality water. In this case, the Central Valley Board has demonstrated that the District's past discharge and current discharge has and will constitute a change to such high quality water.

The second paragraph of Resolution 68-16 states that "Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

In this case, the District's activity of discharging waste constitutes "any activity which produces or may produce a waste." Consequently, the District's discharge is required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge. One disagreement with the District concerns what constitutes "best practicable treatment or control" for purposes of compliance with Resolution 68-16.

Third, Resolution 68-16's mandate requires a discharger to meet waste discharge requirements which will result in best practicable treatment or

control is to assure that (1) a pollution or nuisance will not occur; and (2) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

Here, failing to require tertiary treatment may likely or will result in a condition of pollution or nuisance. Water Code section 13050, subdivision (l) defines pollution as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects the waters for beneficial uses." In the absence of the requirements imposed in the permit, the Central Valley Water Board contends that there would be an unreasonable effect on the waters for beneficial uses through (1) an increased health risk to swimmers; (2) an increased health risk to those that use the waters for municipal use; and (3) an increased health risk to those that use the waters for agricultural use; and (4) a likely impact on pelagic organisms.

b. Antidegradation Policy Implementation for NPDES Permitting

In addition to the Central Valley Water Board's action being supported by State Water Board Resolution No. 68-16, it is also supported by the Antidegradation Policy Implementation for NPDES Permitting (hereafter "Policy").

The Policy points out that "The determination as to whether [an antidegradation] finding is needed must be made when issuing, reissuing, amending, or revising an NPDES permit." Here, there is no question that this provision applies. The permit has not been revised for more than 10 years.

Second, the Policy notes that a complete antidegradation analysis must be conducted when the proposed activity results in mortality or significant growth or reproductive impairment of resident species. There is no qualification that impairment is limited to a particular species¹⁹², but applies to any species supporting the aquatic life beneficial use. This is consistent with the Clean Water Act's mandate that beneficial uses are to be fully protected. (40 CFR section 131.12.) In this case, because of the demonstrated effects on the aquatic life beneficial use, a complete anti-degradation analysis is warranted.

Third, the Policy also points out that the Regional Board should also make this finding when an existing discharge has reduced water quality since the facility was last permitted and the reduction is not authorized by the permit.

¹⁹² The District seems unduly narrow in appearing to claim that as long as fish, such as the delta smelt, are not definitively impacted by the discharge, then there is no adverse effect on the aquatic life beneficial use. Protection of the aquatic life beneficial use is not specifically limited to protection of fish, but applies to all species that support the aquatic life beneficial use. Dr. Engel's idea of "ecological importance" appears to be specifically limited to fish productivity, and in particular, Delta smelt. Again, this is an excessively narrow view of what it would mean to fully protect the aquatic life beneficial use. See, e.g., Transcript at pp. 196-198. As noted by Dr. Foe, it would be "a very unwise thing to reduce primary production rates." (Transcript at p. 198.) And as pointed out by Mr. Landau, "The discharger is trying to divert our attention away from the impacts on the diatoms and copepods and make it an issue of are we harming delta smelt. It is not a delta smelt issue . . . It is the entire ecosystem. This is a beneficial use impact. It is not just an antidegradation issue." (Transcript at p. 435.) (SRCSD_BM_13)

Here, there is no question that there is at least some lowering of water quality for certain constituents to the receiving water as a result of the District's discharge. To take one example, scientific studies developed in the last ten years show that the discharge of ammonia to the Sacramento River is having a much more detrimental effect than previously thought.

Fourth, the Policy goes on to state that if the Regional Board finds that lowering of water quality is consistent with the conditions established in the State policy and the federal regulation, the findings should indicate: (1) the pollutants that will lower water quality; (2) the socioeconomic and public benefits that result from lowered water quality; and (3) the beneficial uses that will be affected. The proposed permit indicates the pollutants that will lower water quality, including, but not limited to, ammonia and certain pathogens, as well as the socioeconomic and public benefits that result from lowered water quality and the beneficial uses to be protected. In this case, the Central Valley Water Board believes that the lowered water quality will have an impact on the socioeconomic and public benefits in that the lowered water quality presents, to take just a few examples, an increased health risk to recreational users, and an increased health risk to aquatic life.

Fifth, in determining whether an antidegradation finding is required, the Policy states that "if the Regional Board has no reason to believe that existing water quality will be reduced due to the proposed action, no antidegradation analysis is required. Here, as noted previously, Central Valley Water Board staff have numerous reasons to believe that existing water quality will be reduced due to the proposed action. In particular, the existing water quality will continue to be degraded as a result of establishing effluent limits for numerous constituents, including, but not limited to, pathogens, ammonia and nitrate. Even more significantly, the failure to implement the requirements in the permit will result in a discharge that will continue to adversely affect one or more beneficial uses.

Sixth, the Policy goes on to state that the antidegradation analysis is needed to support all regulatory actions that, in the Central Valley Water Board's judgment, will result in a significant increase in pollutant loadings. As noted previously, the District's discharge of municipal waste is resulting in a greater degradation than previously determined and an antidegradation analysis to account for the reduction in water quality as a result of the discharge of ammonia and corresponding decreases in dissolved oxygen is warranted.^{193,194,195} Furthermore, it is now better understood that the discharges of ammonia are having an adverse effect on the aquatic life beneficial use. Consequently, there is a corresponding need to account for this degradation of water quality since the permit was last issued more than ten years ago.

¹⁹³ May 2010 LDOPA (SRCSD_OTHER_156)

¹⁹⁴ Copy of DO_Memo_Appendix_C_Data (SRCSD_DATA_024)

¹⁹⁵ Hood flow vs DO (SRCSD_DATA_161)

Moreover, it is important to note that the conditions concerning when a complete antidegradation analysis (ADA) is mandated are not specifically limited to the situations or circumstances noted on page 3 of the Policy. As noted in the section, Implementation of Antidegradation Policies, "If the Regional Board finds the proposed activity does not warrant a complete antidegradation analysis; e.g., one of the criteria listed above is satisfied, such findings should be documented in the Fact Sheet of the proposed permit action or Regional Board order, along with the basis for those findings." The presence of the term "e.g." demonstrates that the conditions to trigger a complete anti-degradation analysis" are not specifically limited to the conditions noted in the Policy's section entitled, "Complete Antidegradation Analysis Required." What seems to be of real concern to the Discharger is that if they had never proposed an increase in capacity to 218 mgd, they feel that they may never have had to provide some of the additional studies relied upon by the Central Valley Water Board to determine that the continuing discharge of municipal waste to the Sacramento River would not result in the full protection of beneficial uses.

Here, because of the changes to the receiving water quality since 2000, in part due to the District's discharge when the permit was last adopted, it was entirely appropriate to require a complete antidegradation analysis in order to compare receiving water quality to the water quality objectives established to protect beneficial uses. This is particularly true given the Delta's importance, state of the science, the magnitude of the discharge, and its demonstrated adverse effects to one or more beneficial uses.

Finally, the Policy states that a complete anti-degradation analysis may not be required if any of four conditions are satisfied. Conversely, a complete anti-degradation analysis may be required when any of the four conditions are not satisfied, namely: (1) A Regional Board determines that the reduction of water quality will be spatially localized or limited with respect to the waterbody; e.g., confined to the mixing zone; (2) A Regional Board, determines the reduction in water quality is temporally limited and will not result in any long-term deleterious effects on water quality; e.g. will cease after a storm event is over; or (3) A Regional Board determines the proposed argument will produce minor effects which will not result in a significant reduction in water quality, e.g. a POTW has a minor increase in the volume of discharge subject to secondary treatment.

In this case, the Central Valley Water Board has demonstrated that (1) the reduction of water quality in the absence of limitations in the permit will not be spatially localized or limited with respect to the waterbody; (2) the reduction in water quality is not temporally limited and it has been demonstrated and will continue to result in long-term deleterious effects on water quality; and (3) the proposed action will produce more than minor effects that has and will continue to result in a significant reduction of water quality if the permit is not affirmed. Consequently, a complete anti-degradation analysis was appropriate in this case.

2. Federal Anti-Degradation Requirements

By way of background, it is important to first note that NPDES permits establish effluent limitations for the polluter. (*Environmental Protection Agency v. California ex rel. State Water Resources Control Board* (1976) 426 U.S. 200, 205.) The Clean Water Act's NPDES Permit program provides for a two-step process for the establishing of effluent limitations. (*Communities for a Better Environment v. State Water Resources Control Board* (2003) 109 Cal.App.4th 1089, 1093.) First, the polluter must comply with technology-based effluent limitations, which are limitations based on the best available practical technology for the reduction of water pollution. (*Ibid.*, citing 33 USC section 1311(b)(1)(A).) In general terms, the Clean Water Act and governing regulations require that in addition to determining an applicant's obligations by focusing on what technology can be used on the applicant's discharges, the permitting agency must also focus on the quality of the body of water into which the applicant is discharging pollutants. (*Divers' Environmental Conservation Organization v. State Water Resources Control Board* (2006) 145 Cal.App.4th 246, 253.) As noted previously, this is consistent with Resolution 68-16's mandate concerning "any change to existing high quality waters" will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge.

40 CFR section 131.12(a)(2) states in pertinent part that where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources.

In this case, requirements in the Adopted Permit are needed in order to fully protect existing uses. If these requirements are not imposed, the REC-1 beneficial use the aquatic life beneficial use, or the MUN use will not be fully protected.

The District essentially claims that the federal and State anti-degradation requirements were never triggered because there is no new discharge or expansion of existing facilities. Even assuming this is true, this is not a sufficient condition for failing to trigger application of the federal anti-degradation policy. Per the Attwater Memo dated 7 October 1987, this statement is specifically qualified by the word "ordinarily" to recognize situations where the federal anti-degradation policy may still be triggered, even assuming that there is no new discharge or expansion of existing facilities. Here, the substantive new information concerning the state of the Delta and the District's discharge and its effects on the Sacramento River and Delta required a full anti-degradation analysis in order to ensure, in part, that a pollution or nuisance will not occur and that there would be no adverse effect to one or more beneficial uses.

As further noted in the Attwater memo, the federal anti-degradation policy has the potential to be applied to virtually every kind of proceeding where water quality standards are established or where activities which affect receiving water quality are permitted. (*Id.* at p. 7.) In the permitting context, the Attwater memo states that whether reductions in receiving water quality may be permitted consistent with the federal anti-degradation policy often will depend upon the conditions existing in the specific waters affected, and the benefits of the proposed discharge. (*Id.* at p. 11.) The memo goes on to state that "Judicious action by the regional boards, based on the facts of different cases and different areas, is the key to establishment of water quality objectives and waste discharge requirements." (*Id.* at p. 11.) In this case, the failure to consider new substantive information concerning the effects of the District's discharge and the state of the science of the Delta in establishing waste discharge requirements would be counter to both the federal and State anti-degradation policies.¹⁹⁶

B. The Regional Board Applied the Wrong Baseline

Waste Discharge Requirements Order No. 5-00-188, the previous NPDES permit adopted in 2000, required many studies to be performed by the Discharger because existing data was not available to make water quality impact determinations on several constituents such as ammonia, pathogens, temperature etc., and is described in Provision E.4. of that Order.

The Discharger is concerned that data in their 2009 Antidegradation Analysis was used for a purpose they did not intend. The Discharger submitted studies, reports and analyses based on the expansion of the SRWTP to 218 mgd dating back to the submittal of the Report of Waste Discharge (ROWD) in 2005. All the analyses were based on the incremental increase from the existing permitted flow of 181 mgd to 218 mgd (37 mgd increase) including the ADA. The 2009 ADA included the results of the dynamic model for constituent concentrations at various locations within the Delta for both flows at 181 mgd and 218 mgd. The Central Valley Water Board already had data that the SRWTP discharge was degrading the water quality through the Discharger's studies on health risks, numerous ammonia studies and data on nutrient impacts to water agencies. In addition to the 2009 ADA model results, the Discharger also submitted model results for 154 mgd (based on the analyses performed for the EIR). The Central Valley Water Board staff compared the receiving water data with the 154 mgd (considered the existing flow since it is close to 141 mgd) and the permitted and design flow for 181 mgd. Comparing the results for the 154 mgd (existing) to the 181 mgd (permitted) shows the discharge continues to degrade existing water quality.

¹⁹⁶ The Attwater memo also reiterates the State's responsibility to assure full protection of existing instream beneficial uses, including the health and diversity of aquatic life. (*Ibid.*) Generally speaking, the requirement that existing instream uses be protected is not satisfied if existing instream beneficial uses will be impaired. (*Ibid.*) 68-16 expressly provides for reasonable protection of potential beneficial uses while the federal anti-degradation policy does not. (*Id.* at p. 17.)

As noted previously, if one were to adopt the District's reasoning, as long as the discharge remained the same, renewal of an NPDES permit would never require additional antidegradation findings, regardless of whether the permit was issued 10 or 20 years ago or even longer, and regardless of whether additional pertinent information was obtained concerning whether the discharge may be having a greater impact on the beneficial uses of a waterbody than previously identified. Such an approach would effectively serve to create one ossified and grossly inaccurate snapshot of the degraded condition of the Sacramento River and the Delta as a result of the discharge with no accounting for whether such a discharge would have any effect on one or more beneficial uses. Given the state of the science concerning the Delta and its unique and extraordinary ecological, municipal use and agricultural values, and the demonstrated evidence that the discharge, without new requirements, would continue to adversely affect one or more beneficial uses, it was entirely appropriate to adopt new antidegradation findings.

C. There is No Evidence the District's Discharge is Significantly Degrading Receiving Water

The Discharger argues that the USEPA significance threshold of 10% should be used to determine if a discharge has a *de minimis* effect, or must be used to determine accompanied by findings regarding the need to accommodate economic and social development for an impact above 10%. Therefore, the Discharger claims that their existing discharge is not degrading receiving water except for three constituents and thus the Central Valley Water Board's findings are unsupported. This argument fails for a number of reasons. First, the Central Valley Water Board is not compelled to follow USEPA guidance in this case and the Discharger's citation to a court decision in the southern district of West Virginia and sixth circuit have no binding authority on the Central Valley Water Board's action. Second, degradation represents any lowering of water quality and neither Resolution 68-16, 40 CFR 131.12 or the State Water Board's Guidance document implementing antidegradation use any such number, whether 10% or otherwise, to establish whether degradation is "significant" or not. In determining whether degradation is to be considered "significant", each discharge should be considered on a case-by-case basis depending on the facts and circumstances specific to the discharge. Furthermore, the purpose of the Clean Water Act is not strictly to maintain and protect high quality waters, but to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. section 1251(a). Thus, to say that the SRWTP discharge is not degrading water quality when, for example, the discharge accounts for over 60% of all the municipal wastewater discharged to the Delta and an 11.5-fold increase in ammonia downstream of the SRWTP is unsupported. If the Discharger's logic was adopted, no receiving water could ever be considered degraded if it fell within the 10% level, regardless of the consideration of any site-specific circumstances or situations, including but not limited to, the fact that the Delta, of which the Sacramento River is an integral part, (1) provides drinking water for more than 25 million Californians and irrigation water for millions of acres of farms in and out of the Central Valley; (2) is one of the most ecologically important habitats in the State; and (3) the fact the SRWTP discharge is within designated critical habitat of the Sacramento River for five federally-listed fish species.

In short, regardless of what is considered a threshold of *de minimis* level the Central Valley Water Board must comply with the SIP in determining Reasonable Potential for which constituents must have limits. All the limits in the Adopted Permit are in compliance with the SIP.

D. The Determination of Best Practicable Treatment or Control (BPTC) Is Unsupported by Facts and Contrary to Law and Policy

The Discharger's main argument to support the claim that the Adopted Permit is not BPTC is based on the fact that the Discharger is not a "similarly situated" discharger to others within the Delta. In response, as noted previously, all other large wastewater treatment plants in the Delta (Lodi, Manteca, Stockton, and Tracy) have tertiary filtration to remove pathogens, and nitrification to remove ammonia and in most cases denitrification to remove nitrates. Furthermore, Lodi, Manteca, Stockton, and Tracy have already completed wastewater treatment plant upgrades and the effluent that they are discharging is much cleaner than the District's effluent. Consequently, Central Valley Water Board believes that District is "similarly situated" to these dischargers.

Another factor in evaluating BPTC are the methods to achieve that water quality and information concerning costs of alternatives is relevant in determining compliance with Resolution 68-16. It is important to note that Lodi, Manteca, Stockton, and Tracy have constructed and are operating similar advanced treatment systems and have not suffered significant adverse economic impacts as a result of these upgrades.¹⁹⁷ To take one example, as it pertains to ammonia, all other large wastewater treatment plants in the Delta already remove ammonia from their discharges. Consequently, almost all the ammonia discharged to the Delta is from the District's discharge.

1. BPTC is Not Treatment for Treatment's Sake

See response to Section V. E. - Best Practicable Treatment or Control (BPTC).

2. Bullet Points Are Not Analysis

See response to VII. A. Renewal of the District's Permit Did Not Trigger State or Federal Antidegradation Review.

3. The Regional Board Did Not Conduct the Required Balancing of Socioeconomic Impacts and Water Quality Benefits

a. The Regional Board's Consideration of Socioeconomic Impacts Was Superficial and Deficient

See response to Section IV. Cost Considerations.

¹⁹⁷ To the Central Valley Water Board's knowledge, aside from the District's claims of economic hardship, there is absolutely no evidence anywhere in the record that any discharger to the Delta has suffered ANY adverse economic impacts—let alone "significant" ones—as a result of constructing and operating similar treatment systems and upgrades.

b. The Cost Information Related to Other Dischargers Is Biased, Suspect, and Misleading

The Central Valley Water Board considered publicly available cost data in determining requirements that implement best practicable treatment or control. Table F-17 (in the Adopted Permit) is relevant evidence in determining satisfaction of the anti-degradation policy. To take one example, Table F-17 is relevant in considering whether the waste discharge requirements will result in the best practicable treatment or control of the discharge as the table helps to establish, in part, that the costs per capita to implement advanced treatment processes at other POTWs are similar to the projected costs per capita for advanced treatment at the SRWTP.

In seeking to strike Table F-17 from the permit entirely, the District claims that none of the entities listed in Table F-17 are "similarly situated" dischargers. The entities listed in Table F-17 were chosen because they are a cross-section of representative dischargers within the Central Valley Water that have upgraded to tertiary requirements. Furthermore, many of these entities are large wastewater treatment plants in the Delta (e.g., Cities of Lodi, Manteca, Stockton, and Tracy) and therefore the use of Table F-17 is entirely proper.¹⁹⁸ (See also Transcript at p. 76.)

By contrast, the District wanted Table F-17 removed and believes that they are "similarly situated" to the cities of Yuba City, Corning, and Chico. Although it is true that these facilities are not currently required to implement tertiary filtration, nitrification, or denitrification, this claim ignores the fact that all large wastewater treatment plants in the Delta, with the exception of the SRWTP, already provide tertiary treatment and full nitrification. Furthermore, it ignores the significantly greater average dilution for these Dischargers in relation to the District's discharge. For example, the average dilution for the City of Corning is 4,100-to-1 and the average dilution for City of Chico is 400-to-1 versus the District's average dilution of 50-to-1. The long term dilutions for the Cities of Manteca, Tracy, and Stockton are 222:1, 20:1 and 10:1, respectively. These average dilutions are more inline with the average dilution for the SRWTP. Furthermore, Yuba City, Corning, and Chico discharges, unlike the District's discharge, do not have corresponding issues pertaining to pelagic organism decline, a high level of public contact, a major drinking water source, and extensive agricultural irrigation use. Therefore, it is not appropriate to consider the District as "similarly situated" to the Cities of Yuba City, Corning, and Chico. Again, the dischargers in the Delta, in particular Lodi, Manteca, Stockton and Tracy, are more similarly situated.

¹⁹⁸ See also Transcript at pp. 76-77 stating that the large Delta dischargers, namely Lodi, Manteca, Stockton, Tracy all have Title 22 (or equivalent) disinfection for pathogen removal, as well as ammonia removal, and nitrate removal is the same except for the City of Stockton. (SRCSD_BM_13)

c. The District's Situation Is Not Similar to Other Discharges Cited in the Permit

As the most significant discharger to the Delta, Sac Regional is "similarly situated" to all the other major wastewater treatment plants in the Delta, namely the Cities of Lodi, Manteca, Stockton, and Tracy. In particular, all of these other large wastewater treatment plants have Title 22 (or equivalent) disinfection to remove pathogens and nitrification to remove ammonia and in most cases denitrification to remove nitrates. Furthermore, Lodi, Manteca, Stockton, and Tracy have already completed wastewater treatment plant upgrades and the effluent that they are discharging is much cleaner than the Discharger's effluent. To somehow say that the Discharger should not have to provide best practical treatment or control through Title 22 (or equivalent) disinfection to remove pathogens and through nitrification to remove ammonia and through denitrification to remove nitrates when all the other major wastewater treatment plants have such processes in place and when such processes have resulted in much cleaner effluent than Discharger's effluent, would be unreasonable. In short, best practicable treatment or control includes Title 22 (or equivalent) disinfection and nitrification of ammonia and denitrification to remove nitrates when these processes have been put in place by all the other major wastewater treatment plants in the Delta, the processes have resulted in much better effluent quality than the Discharger's effluent, and it has occurred without economic or socioeconomic harm to the Cities of Lodi, Manteca, Stockton, or Tracy.

d. The Regional Board Did Not Adequately Consider Feasible Alternatives

The Central Valley Water Board identified and evaluated several tentative alternatives to the limitations adopted in the permit including those proposed by the Discharger. The alternatives were discussed in the following documents that were publicly distributed for stakeholders review and were considered by the Central Valley Water Board:

1. NPDES Permit Renewal Issues, Drinking Water Supply and Public Health, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, 14 December 2009
2. NPDES Permit Renewal Issues, Aquatic Life and Wildlife Preservation, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, 28 April 2010
3. Tentative NPDES Permitting Options, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, 3 September 2010
4. The Response to Comments, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, 30 November 2010

5. Staff Report, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Proposed NPDES Permit Renewal and Time Schedule Order, Sacramento County, 30 November 2010
6. Tentative NPDES Permitting Options, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, 30 November 2010.
7. Central Valley Water Board staff presentation of 9 December 2010

The Discharger is incorrect in its claim that the Central Valley Water Board did not consider feasible alternatives. Tentative alternatives for pathogen removal, nitrification, and denitrification were issued for public review in the same tentative package containing the tentative NPDES permit and notice of public hearing.

E. The Absence of Environmental and Public Health Benefits Renders the Challenged Permit Requirements Unreasonable

Implementation of nitrification/denitrification and Title 22, or equivalent, disinfection is required in the Adopted Permit to protect the beneficial uses of the receiving water. In addition, these treatment levels are considered BPTC for this discharge. The environmental benefits are discussed in Sections V-VIII, above.

The cross-media impacts the Discharger alludes to are minor. By removing both ammonia and nitrate from the effluent, nitrogen gas is discharged to the atmosphere. Nitrogen gas is the major gas of composing the atmosphere and has no demonstrable impact to the environment.¹⁹⁹ Higher concentration of pathogens and metals in sludge due to filtration will be regulated by the U. S. EPA 40 CFR Part 503 regulations.
Discharger

F. Conclusion

The Central Valley Water Board found the discharge of ammonia and nitrate by the District are currently impacting the beneficial uses of the Sacramento River, Delta, and State Water Project as described above.²⁰⁰ Additionally, the discharge increases the risk of illness and infection downstream as described in the Discharger's own report. Based on these findings, BPTC must be implemented and, for this discharge, BPTC is nitrification/denitrification and Title 22 (or equivalent) disinfection.

¹⁹⁹ Central Valley Water Board staff presentation, 9 December 2010, slide #84. (SRCSD_BM_10)

²⁰⁰ See also Transcript at p. 118 noting that no mixing zone for ammonia or nitrate was allowed because of demonstrated impacts outside the mixing zone. (SRCSD_BM_13)

IX. OTHER MIXING ZONES WERE IMPROPERLY DENIED AND AN INAPPROPRIATE CHRONIC TOXICITY TRIGGER WAS ESTABLISHED

The Discharger contends that the Central Valley Water Board improperly denied an acute aquatic life mixing zone, as well as, denied dilution credits for copper, cyanide, chlorpyrifos, diazinon, and chronic toxicity. The Adopted Permit includes the rationale for allowing/denying mixing zones and dilution credits (see Fact Sheet pps. F-28 – F-45).

The Discharger has requested mixing zones and dilution credits for compliance with acute and chronic aquatic life water quality criteria, and human carcinogen water quality criteria. The Central Valley Water Board has the discretion to accept or deny mixing zones and dilution credits.²⁰¹ The CWA directs states to adopt water quality standards to protect the quality of its waters. USEPA's current water quality standards regulation authorizes states to adopt general policies, such as mixing zones, to implement state water quality standards (40 CFR section 122.44 and section 122.45). The USEPA allows States to have broad flexibility in designing its mixing zone policies. The primary policy and guidance on determining mixing zone and dilution credits is provided by the SIP and the Basin Plan. The mixing zone requirements contained in the SIP and the Basin Plan were followed when applying dilution credits in the Adopted Permit.

The allowance of mixing zones by the Central Valley Water Board is discussed in the Basin Plan, Policy for Application of Water Quality Objectives, which states in part, *"In conjunction with the issuance of NPDES and storm water permits, the Regional Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional Board that the mixing zone will not adversely impact beneficial uses. If allowed, different mixing zones may be designated for different types of objectives, including, but not limited to, acute aquatic life objectives, chronic aquatic life objectives, human health objectives, and acute and chronic whole effluent toxicity objectives, depending in part on the averaging period over which the objectives apply. In determining the size of such mixing zones, the Regional Board will consider the applicable procedures and guidelines in the EPA's Water Quality Standards Handbook and the [TSD]. Pursuant to EPA guidelines, mixing zones designated for acute aquatic life objectives will generally be limited to a small zone of initial dilution in the immediate vicinity of the discharge."*²⁰²

Section 1.4.2 of the SIP states, in part, *"...with the exception of effluent limitations derived from TMDLs, in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a basin plan, the Regional Board may grant mixing zones and dilution credits to Dischargers ... The applicable priority pollutant criteria and objectives are to be met throughout a water body except within any mixing zone granted by the Regional Board. The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis. The Regional Board may consider allowing mixing zones and dilution credits only for discharges with a physically identifiable point of discharge that is regulated through an NPDES permit*

²⁰¹ SIP, Section 1.4.2

²⁰² Basin Plan, page IV-16.00

*Issued by the Regional Board.*²⁰³

A mixing zone is an administrative construct defined as an area around the outfall that may exceed water quality objectives, but is otherwise protective of beneficial uses. Dilution is defined as the amount of mixing that has occurred at the edge of this mixing zone under critical conditions, thus protecting beneficial uses at the concentration and for the duration and frequency required.

A. The denial of an acute aquatic life mixing zone is not justified.

USEPA Region VIII, in its "EPA Region VIII Mixing Zones and Dilution Policy", recommends no dilution for acute aquatic life criteria, stating the following, "*In incomplete mix situations*²⁰⁴, discharge limitations to implement acute chemical-specific aquatic life criteria and narrative (no acute toxicity) criteria shall be based on achieving such acute criteria at the end-of-pipe (i.e., without an allowance for dilution). This approach is intended to implement the narrative requirement prohibiting acutely toxic conditions in the mixing zone."²⁰⁵ The Discharger has requested an acute mixing zone for compliance with acute water quality criteria for ammonia, copper, cyanide, and chlorpyrifos.

The Discharger provided a mixing zone study to demonstrate compliance with the SIP. Although the acute aquatic life mixing zone, as requested by the Discharger complies with the specific mixing zone criteria required in the SIP and the Basin Plan²⁰⁶, due to concerns with aquatic toxicity in the Delta, the Central Valley Water Board denied the allowance of an acute aquatic life mixing zone in the Adopted Permit. Section 1.4.2 of the SIP states, in part, "The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis." In this case, the Delta is impaired for unknown toxicity and has experienced a significant pelagic organism decline.

Therefore, the Central Valley Water Board found that the allowance of an acute aquatic life mixing zone, which would allow for increased pollutant loadings of toxic pollutants to the Delta, is not acceptable for this incomplete mix discharge. The Central Valley Water Board found that it is not good policy to allow mixing zones in a water body that has declining water quality and has been demonstrating an ecological decline. Just because a mixing zone study indicates that a mixing zone meets the specific mixing zone criteria of the SIP at the point of discharge, the mixing zone does not address the bigger picture of overall health of the Sacramento River and Delta.

Regardless, as discussed in the pollutant-by-pollutant evaluation in the Fact Sheet (pages F-40 through F-45), for the constituents that the Discharger requested acute dilution credits, either the Facility can meet water quality based effluent limitations (WQBELs) without acute dilution credits (i.e., copper and cyanide), the SIP's mixing zone criteria are not met (i.e., ammonia), or dilution credits are not allowed by the Basin

²⁰³ SIP, pg. 15

²⁰⁴ SRWTP discharge is an incomplete mix situation

²⁰⁵ USEPA Region VIII Mixing Zones and Dilution Policy, December 1994 (Updated September 1995), (page 18) (SRCSD_OTHER_018)

²⁰⁶ As discussed in the Fact Sheet (pps. F-40 – F-41), an acute aquatic life mixing zone for ammonia does not meet the SIP's mixing zone criteria. (SRCSD_OTHER_018)

Plan (i.e., chlorpyrifos and diazinon). Consequently, the Central Valley Water Board only used its discretion to not allow acute dilution credits for copper²⁰⁷ and cyanide. For the remaining constituents, acute dilution credits are not allowed by the SIP or Basin Plan. The basis for not allowing mixing zones for ammonia is discussed in response to Statements of Points and Authorities VI, above.²⁰⁸ The basis for denying dilution credits for copper, cyanide, chlorpyrifos, and diazinon are discussed below.

B. The Regional Board improperly denied use of a dynamic model for copper.

The Discharger contends that since the Central Valley Water Board accepted its dynamic model that it should be used to establish the WQBELs for copper, regardless of any other information. In this case, the Facility can meet end-of-pipe limits, so dilution credits are not necessary, and backsliding by imposing an effluent limitation that allows the Discharger to increase the existing concentration of a constituent is not in accordance with federal antibacksliding regulations.

The Discharger contends that the dynamic modeling is more robust than the steady state modeling used to calculate the WQBELs for copper in the Adopted Permit. Although the Central Valley Water Board concurred that a dynamic modeling approach is more accurate and reflective of ambient water quality conditions, the effluent limits requested by the Discharger using its dynamic model with acute and chronic mixing zones cannot be compared to the end-of-pipe effluent limits in the Adopted Permit using a steady state modeling approach. It is not an "apples to apples" comparison. The Discharger's proposed dynamic model-derived limits allow mixing zones where the copper criteria are exceeded in the effluent, and the receiving water within the mixing zones. The established steady-state end-of-pipe copper limits in the Adopted Permit were developed such that the effluent never exceeds the copper criteria, and any mixture of the effluent and receiving water do not exceed the criteria. A statistical evaluation of effluent data from June 2005-October 2009²⁰⁹ demonstrates that the Facility can comply with end-of-pipe effluent limits for copper. Therefore, although the Discharger's dynamic model is sound and an acceptable model for NPDES permitting, in this case it is not appropriate to allow dilution credits for copper.

C. The Regional Board improperly denied acute aquatic life dilution credits for cyanide.

The Discharger requested acute and chronic mixing zones and requested dilution credits for cyanide. Although the acute and chronic mixing zones meet the requirements of the SIP, the first step for developing the final water quality based

²⁰⁷ See Transcript at p. 114 noting that the facility can currently meet end-of-pipe limits without dilution so no dilution was allowed for copper. (SRCSD_BM_13)

²⁰⁸ "Despite the discharge making up only two percent of the river, the downstream ammonia concentration of the river is increased over ten times and can be detected all the way to Suisun Bay 50 miles downstream." (Transcript at p. 120.) "Ammonia discharge from Sac Regional makes up 99% of the ammonia load to the Delta." (*Id.*). "[a]mmonia levels in the Sacramento River are sufficient to be toxic from the point of discharge to Rio Vista which is about 35 miles downstream." (Transcript at p. 123.) See also Transcript at pp. 123-124 noting that there is a reduction of primary production at least 50 miles downstream to Suisun Bay. (SRCSD_BM_13)

²⁰⁹ Copper Regression on order statistics (ROS) (SRCSD_DATA_113)

effluent limitations (WQBELs) for cyanide was to determine if dilution credits are actually needed by reviewing the performance of the Facility. If a Discharger can meet effluent limits without dilution or less dilution than is being requested, then in order to comply with federal and State antidegradation requirements, the permit must require the Facility meets best practicable treatment or control (BPTC) for that constituent. This means that it would not be appropriate to allow a dilution credit. Table F-12 in the Adopted Permit, shown below, displays the WQBELs for cyanide calculated using Discharger's dynamic model with the allowance of acute and chronic aquatic life dilution, WQBELs calculated using Discharger's dynamic model with the allowance of only chronic aquatic life dilution, end-of-pipe effluent limitations using a reasonable worst-case steady-state approach, and the Facility's performance. As shown in the table, the Discharger clearly does not need acute dilution credits. In fact, the Facility can meet effluent limits more stringent than would be allowed using the full chronic dilution credits. To ensure compliance with the Antidegradation Policy, the Adopted Permit requires a maximum daily effluent limit for cyanide of 11 µg/L, which is based on the performance of the Facility.

Table F-12. WQBELs for Cyanide

	Average Monthly Effluent Limitation	Maximum Daily Effluent Limitation
Dynamic Modeling (acute and chronic dilution)	21 µg/L	40 µg/L
Dynamic Modeling (chronic dilution only)	11 µg/L	22 µg/L
Steady-State Approach	4.3 µg/L	8.3 µg/L
Facility Performance ¹	11 µg/L	

¹ Projected 99.9th percentile of effluent cyanide data from June 2005-October 2009²¹⁰

The Discharger states that, instead, WQBELs should be calculated with consideration of an acute and chronic mixing zone using the approved dynamic model. To the extent that the Central Valley Water Board determines that the calculated WQBELs are higher than necessary to ensure consistent compliance, the Discharger requests that final WQBELs then be set in a manner that is consistent with their proposed approach in their memorandum *Approach to Water Quality-Based Effluent Limits Based on Performance*. (Betsy Elzufon, Larry Walker Associates, *Approach to Water Quality-Based Effluent Limits Based on Performance* (Aug. 2010) (Elzufon Effluent Limits Memo).²¹¹ Using the Discharger's proposed approach, the final effluent limits would be 15 µg/L and 9.7 µg/L as the maximum daily effluent limit and average monthly effluent limit, respectively. (Elzufon Effluent Limits Memo at p. 4). However, to ensure compliance with the State Water Board's Antidegradation Policy, it is necessary to require the Facility meets BPTC of the discharge for cyanide. In this case, a performance-based maximum daily effluent limitation of 11 µg/L for cyanide is required.

²¹⁰ Cyanide Regression on order statistics (ROS) (SRCSD_DATA_117)

²¹¹ Betsy Elzufon, Larry Walker Associates, *Approach to Water Quality-Based Effluent Limits Based on Performance* (Aug. 2010) (SRCSD_OTHER_187)

Limits based on the full dilution credits or the Discharger's proposed approach would allow a lower level of treatment and thus not meet BPTC.

D. The Regional Board improperly denied dilution credits for chlorpyrifos and diazinon.

Although the Discharger has withdrawn its contention regarding the denial of dilution credits for chlorpyrifos, a response is provided. In October 2005, the Central Valley Water Board updated the Basin Plan based on the total maximum daily load (TMDL) established for chlorpyrifos and diazinon. The TMDL, which became effective in December 2006, established a waste load allocation (WLA) for NPDES dischargers and required compliance by 1 December 2011.²¹² In developing the TMDL, dilution credits were not considered. Therefore, the Basin Plan does not allow for a dilution credit in the implementation of the WLA. If a dilution credit was allowed for the Discharger, the WLA for other dischargers would need to be reduced. The TMDL would need to be modified and a Basin Plan amendment would be required to allow a dilution credit. Consequently, the Adopted Permit properly denied dilution credits for chlorpyrifos.

E. The Regional Board improperly denied a chronic toxicity trigger of 13.3 Toxicity Units (TUs).

The Discharger provided modeling output with its comments on the tentative permit²¹³ that estimates the dilution at the edge of the chronic mixing zone (i.e., 350 feet downstream of the outfall) is 13.3:1. Based on this modeling a chronic toxicity trigger of 13 TUs was requested by the Discharger. The Adopted Permit includes a chronic toxicity trigger of 8 TUs, which is the toxicity trigger in the previous permit (Order 5-00-188). The Discharger has shown consistent compliance with this trigger and it will require proactive efforts to evaluate effluent toxicity before chronic toxicity is experienced outside the chronic toxicity mixing zone.

When establishing dilution credits for chronic toxicity it is appropriate to include some level of safety to prevent toxicity outside of the mixing zone. For chemical-specific effluent limits for toxic pollutants, when dilution credits are allowed, the discharge is allowed to exceed aquatic life criteria. This does not mean toxicity will occur in the mixing zone because conservative measures are taken when establishing the criteria, and conservative assumptions for the critical flows, water-effects ratio, and other factors such as metal translators are used when establishing the effluent limits. However, for chronic toxicity, if the threshold is exceeded, there is near certainty that toxicity is occurring in the mixing zone. Allowing the full dilution to establish the toxicity would mean that the Discharger only begins to evaluate the toxicity of the discharge after toxicity has occurred in the receiving water outside the mixing zone.

²¹² In the adopted Permit, the TMDL compliance date for the Sacramento River, rather than the Delta Waterways is inadvertently used to implement the objective. Consequently, the compliance schedule for chlorpyrifos was included in the Time Schedule Order.

²¹³ Comments on Tentative Permit from Stan R. Dean, Sacramento Regional County Sanitation District w/ CD (SRCSD_CORR_1002)_

In the Adopted Permit, a lower chronic toxicity trigger was included to ensure the Discharger begins proactive measures to prevent chronic toxicity in the receiving water outside of the mixing zone before it occurs. The chronic toxicity trigger of 8 TUc is at a level that the Discharger has demonstrated can be met consistently by the Facility.²¹⁴

X. THE PERMIT MONITORING REQUIREMENTS FOR NDMA VIOLATES FEDERAL REGULATIONS AND THE SIP

Nitrosamines, mainly N-nitrosodimethylamine (NDMA), N-nitrosomethylethylamine (NMEA) and N-nitrosodiethylamine (NDEA) are highly mutagenic compounds that are suspected of carcinogenic activity to the human body²¹⁵. CTR includes a criterion of 0.00069 µg/L (or 0.69 ng/L) for N-nitrosodimethylamine (NDMA) for the protection of human health for waters from which both water and organisms are consumed. NDMA is formed as a disinfection by-product from wastewater and chlorination. Historically, NDMA was used to make rocket fuel until contamination was found in air, soil and water. NDMA is produced currently only as a research chemical. Detection levels for NDMA are greater than the water quality criterion and can range from 0.002 µg/L to 30 µg/L. From June 2005 to July 2008, 15 percent of effluent samples detected NDMA at levels greater than the water criterion. However, this detection percentage may be underestimated since the detection levels for sampling effluent are often too high to detect low concentrations of NDMA. Similarly, the receiving water showed no detectable concentrations for NDMA, but the detection limits are too high to detect low concentrations. The California Department of Water Resources (DWR) is currently studying NDMA in the Sacramento-San Joaquin Delta. Preliminary data shows NDMA has not been detected at Hood, eight miles downstream of the discharge on the Sacramento River. However, DWR did find the NDMA precursors (constituents that create NDMA) significantly greater (i.e., 3 to 4 times) below the discharge compared with above the discharge.²¹⁶

The Discharger contends that USEPA method 521 to monitor for NDMA can not be required because it violates federal regulations and the SIP. The SIP establishes 40 CFR Part 136 lists as the approved laboratory methods for monitoring CTR constituents unless the Discharger and RWQCB agree to include another test method. The test methods listed in 40 CFR 136 for NDMA are EPA methods 607, 625 and 1625B, Standard Methods 6410B and USGS Method 0-3116-87. The following table shows the approved methods and their detection limits for the various test methods for wastewater.

²¹⁴ Summary of Toxicity Results (SRCSD_DATA_083)

²¹⁵ Report regarding "N-Nitrosomethylamine (NMEA) and N-Nitrosodiethylamine (NDEA), Two Potential Disinfection Byproducts..." (SRCSD_OTHER_360)

²¹⁶ "Investigation into the sources of nitrosamines and their precursors in the Sacramento-San Joaquin Delta, California", Carol L DiGiorgio, California Department of Water Resources, Municipal Water Quality Investigations Unit. Poster presented from 10 -11 August 2009. (SRCSD_OTHER_239)

Test Method	Method Detection Limit (MDL) (g/L)
EPA 607	150 ng/L
EPA 625	Refers to Method 607 @ 150 ng/L
EPA 1625B	50,000 ng/L
Standard Method 6410B	No MDL; not recommended for NDMA due to decomposition in gas chromatographic inlet & can't be separated from diphenylamine
USGS Method 0-3116-87	UNKNOWN

None of the approved methods can detect NDMA at the water quality criteria. EPA Method 521 used for drinking water analysis has a method detection level of 0.28 ng/L and a reporting level of 4 ng/L. EPA method 521 has been used by the Discharger to determine if NDMA is detected in the influent or effluent. When EPA method 521 is used NDMA was detected in the effluent. When other methods were used, often NDMA was not detected, likely because the detection limit was too high. EPA method 521 was recommended by Mr. Bruce Macler of USEPA Region 9, who sits on the Municipal Water Quality Investigations Technical Advisory Committee at DWR.²¹⁷ The Water Reuse Foundation with assistance from the State Water Board, examined use of several laboratory analysis techniques for several water matrixes with the hope of finding cost-effective methods with low detection limits. The Advisory Committee found that the techniques used for drinking water could successfully be used for secondary effluent.²¹⁸ In order to determine compliance with the effluent limit, laboratory methods with a reasonably low method detection limit must be used. Therefore, the Central Valley Water Board implemented monitoring requirements that provide for appropriate method detection levels.

²¹⁷ Email to Carol DiGiorgio, DWR from Bruce Macler, Region 9-USEPA dated 29 April 2010. (SRCSD_CORR_2080)

²¹⁸ Alternative Methods for the Analysis of NDMA and Other Nitrosamines in Water And Wastewater, WaterReuse Foundation. 2005. (SRCSD_OTHER_376)

RESPONSES TO PETITIONER'S ARGUMENTS

The following are the Central Valley Water Board's responses to discrete contentions raised in CSPA's petition. For convenience, the responses are correlated to the issues as they appear in the petition.

CALIFORNIA SPORTFISHING PROTECTION ALLIANCE - SWRCB/OCC A-2144(b)

CONTENTION A. Federal Regulation 40 CFR 124.7 (e) requires that all draft permits shall be accompanied by a statement of basis, shall be based on the administrative record, and shall be publically noticed and made available for public comment. Federal Regulations 40 CFR 124.10 requires notification that a draft permit has been prepared and that at least 30 days are allowed for public comment. Federal Regulations 40 CFR 124.14 contains requirements for reopening the public comment period including reissuance of a draft permit. Significant changes were made to the Permit after closure of the public comment period. Those changes were not made available for public comment and a new draft permit has not been reissued. Late revisions of the permit were also made and presented shortly before the Regional Board's public hearing on the matter. CSPA's utilized our allotted time before the Regional Board at the public hearing to orally discuss these several significant issues.

The tentative permit was issued for a 30-day public comment period on 3 September 2010. The Central Valley Water Board received a substantial amount of comments. Substantial changes made to the tentative permit that were part of the Board agenda package were based on public comments. Other changes were made to the tentative permit in the agenda package and as late revisions at the Board hearing to either correct errors or provide further clarification to the proposed permit. The agenda version of the tentative permit issued to the public for a subsequent 10-day public comment period prior to the Board hearing. Board staff presented late revisions to the Board during its staff presentation and the public was given the opportunity to comment on the late revisions during the hearing.

CSPA's citations to 40 CFR section 124.7 and 124.14 are misplaced. These requirements are not specifically enumerated as applicable to state programs and thus do not apply. See 40 CFR section 123.25. CSPA further contends the following as part of Contention A:

1. *The Permit, page 5, Finding No. B and Discharge Prohibition No. B allows for extracted groundwater, estimated at approximately 1.0 mgd, to be discharged into the effluent channel downstream of the secondary clarifiers and upstream of the plant chlorination station bypassing the majoring of treatment processes. Federal Regulation, 40 CFR 122.41, define bypass as any intentional diversion of waste streams from any portion of a treatment facility. CSPA contends a bypass of treatment is prohibited and discharging after the secondary clarifiers constitutes a bypass.*

The Central Valley Water Board notes that the groundwater extraction is part of the Discharger's Corrective Action Program (CAP) to remove and contain nitrates and salts in the groundwater. The extracted groundwater is not a waste type that requires secondary treatment and, until nitrogen removal is implemented, there is no environmental benefit to having the groundwater flow through the wastewater

treatment plant. Normally such a discharge of treated groundwater would have its own discharge point and permit, however it was more efficient to regulate the groundwater waste stream in the SRWTP permit and have it discharge through the SRWTP outfall. The extracted groundwater was never part of the SRWTP influent, so it cannot be a "bypass."

2. *The effluent limitation for electrical conductivity (EC) was increased from 840 to 900 $\mu\text{mhos/cm}$ without any written justification.*

The Central Valley Water Board notes that the Discharge does not demonstrate reasonable potential to cause or contribute to an exceedance of the applicable water quality objectives for salinity, including EC. However, due to concerns with salt loading to the Delta, a performance-based effluent limit for EC was established in the Adopted Permit to cap the discharge at its current EC level. The Discharger provided comments on the tentative Order that the proposed performance-based effluent limits for EC of 840 $\mu\text{mhos/cm}$ did not allow for consideration of water conservation, which could increase salinity concentrations. The Discharger requested an annual average effluent limit of 1000 $\mu\text{mhos/cm}$ for EC. The Central Valley Water Board encourages water conservation and agreed that water conservation can result in increased concentrations of EC in the effluent. Consequently, the EC effluent limit was increased slightly, but not up to the limit requested by the Discharger. The Discharger is required to prepare and implement a salinity evaluation and minimization plan to ensure the concentrations of salinity in its discharge does not increase above the 900 $\mu\text{mhos/cm}$ limit during further proposed water conservation efforts.

3. *A revision to the tentative Permit included the addition of a Receiving Water limitation for temperature that reads:*

"The discharge shall not cause the receiving water temperature to increase more than 4°F above the ambient temperature of the receiving water at any time or place outside the initial dilution."

CSPA contends that the Thermal Plan does not grant a zone of initial dilution and the addition of this zone of dilution is a significant relaxation of the thermal plan requirements.

The Central Valley Water Board notes that there are two issues in this contention.

First, the Thermal Plan clearly establishes zones of dilution. For instance, Thermal Plan Section 5.A.(1)a. requires that existing elevated temperature discharges not exceed the natural water temperature by more than 20°F. Thermal Plan Section 5.A.(1)b requires that no more than 25% of the cross sectional area of the receiving water be increased by more than 1°F. Although not explicitly stated, the Thermal Plan must allow zones of dilution for an effluent 20°F above the receiving water temperature that meets 5.A.(1)a could never meet the 1°F limitation for increased receiving water temperature in 5.A.(1)b.

Second, it was noticed that the receiving water temperature limitation in Thermal Plan section in 5.A.(1)c had been left out of the tentative permit circulated for public review and comment. SRCSD must comply with this limitation because it is in the Thermal Plan, and the District had not requested an exemption involving this section, so a receiving water limitation implementing 5.A.(1)c was added to the agenda version of the permit. Unfortunately, language from 5.A.1(b) regarding a zone of initial dilution was added to the language from 5.A.1(c), in error, which is the reason for part of CSPA's comment. The drafting error was noticed and corrected at the Board meeting. The Adopted Permit includes correct language implementing 5.A.1(c).

4. *The Permit, Receiving Water Limitations, Surface Water Limitations was modified to allow a minimum pH of 6.0. The Basin Plan Water Quality Objective for pH requires that wastewater discharges not cause the pH to be depressed below 6.5.*

The Central Valley Water Board notes that the tentative permit in the agenda package included a receiving water pH limitation of 6.0. The receiving water limit for pH was corrected during the Board hearing. The Adopted Permit includes a receiving surface water limit for pH that does not allow the receiving water to be depressed below 6.5 or increase above 8.5, which is consistent with the pH water quality objectives in the Basin Plan.

5. *The Permit was modified to state that compliance with the Turbidity Receiving Water Limitation shall be determined using data samples for monitoring station RSWD-003 (4200 feet below the discharge location) and analyzed with data from RSWD-001 (upstream from the discharge). The distance between the monitoring is too great to protect the beneficial uses impacted by turbidity.*

The Central Valley Water Board notes that this compliance determination language was added to the tentative permit as a late revision to provide further clarification for compliance and enforcement purposes only. These receiving water monitoring locations are the first upstream and downstream monitoring locations. The clarification does not change the originally proposed receiving water limitation or monitoring locations. Regardless, this is a non-issue, because there are no beneficial use impacts from turbidity. The current secondary treatment discharge is low in turbidity and is typically less than the upstream receiving water.²¹⁸ Furthermore, the Adopted Permit requires Title 22 (or equivalent) disinfection, which will result in very low turbidity.

6. *The Monitoring and Reporting Program has been modified to change effluent hardness sampling from grab samples to 24-hour composites. The composite samples will average the hardness and will not represent the worst case hardness.*

²¹⁸ Estimated Risk of Illness from Swimming in the Sacramento, Dr. Charles Gerba, 23 February 2010, Appendix 2 (SRCSD_OTHER_148)

The Central Valley Water Board notes that the sample type for hardness was changed as a late revision to a 24-hour composite sample, per the Discharger's request, to be consistent with the metals sampling, which have California Toxic Rule (CTR) criteria that vary with hardness. The hardness monitoring is not for compliance purposes since the Adopted Permit does not include a hardness effluent limitation. The purpose of the hardness monitoring data is for further evaluation of the site-specific hardness-dependent criteria for future permitting. Therefore it is only appropriate for the sample type to be consistent with the sample type of the metals monitoring. Hardness of the effluent is not expected to vary substantially during a 24-hour period, yet 24-hour composite hardness monitoring will capture any variations in effluent hardness, similar to the intention of the composite monitoring for metals.

7. *The Monitoring and Reporting Program has been significantly relaxed by removing the requirement to re-sample and re-test if an acute toxicity test failure occurs.*

The Central Valley Water Board notes that the Monitoring and Reporting Program for the Adopted Permit requires weekly 96-hour continuous flow through acute toxicity testing with rainbow trout starting July 2011. If a toxicity test was to fail, by the time the results are obtained, the Discharger will already be starting the next set of required weekly acute tests. Therefore, the typical re-test requirements included in most NPDES permits does not make sense for this discharge. Most dischargers are required to conduct monthly acute toxicity testing, in which a more immediate re-test is crucial if a toxicity test fails. When testing is already required weekly, little information will be gained by instituting additional acute toxicity testing immediately after a test failure which overlaps with the weekly testing that is to begin within days. Having a retest of a failed sample being conducted at the same time as a weekly test is not practicable and unnecessary.

8. *The Permit was significantly revised to include a discussion of mixing zone conditions.*

- a. *CSPA contends that a fish passage on the east side of the river may not exist as stated in the Adopted Permit. The contention refers to Tetra Tech's analysis of the dynamic model results compared with dye studies completed in 2005.*

The Central Valley Water Board notes that the 2005 dyes studies show a significant concentration of dye on the east side of the river. Based on the 2005 dye study results, the Discharger concluded that sediment was collecting upstream on the diffuser structure, creating an eddy that diverted the effluent back upstream on the east side of the river. To remedy this problem, the Discharger closed 25 diffuser ports on the east side of the diffuser. Dye tests were conducted in the Fall of 2007 to verify the dynamic model and determine if closing the ports eliminated the eddy that diverted the effluent upstream and to the east bank of the river. The subsequent dye study confirmed that the eddy was substantially, but not completely

eliminated, and that the closure of the 25 ports on the east side of the diffuser provides a fish passage on the east bank.²²⁰

- b. *CSPA contends that the evaluation conducted to determine the organism time in the mixing zone is not adequate in determining the lethality of the mixing zone. The Adopted Permit describes the float time for an organism through the mixing zone is based on river velocity of 0.35 feet/second and is about 2.8 minutes. The USEPA recommends the float time to be less than 15 minutes to ensure that there will not be lethality to passing organisms.*

The evaluation recommended by USEPA in the TSD²²¹ is for organisms that are floating through the mixing zone. CSPA's contention is that the time it takes for a fish to migrate and pass the mixing zone should have been considered. Migrating and other free-swimming organisms were considered. The recommendation by USEPA is for floating organisms that do not have the ability to avoid the plume. Migrating fish and other free-swimming organisms have the ability to avoid the plume. The USEPA recommendation is based on the assumption that the effluent is repulsive, such that free-swimming organisms would avoid the mixing zone. However, USEPA cautions that it is necessary to evaluate whether the effluent plume is an attractant.²²² The Adopted Permit requires the Discharger conduct a thermal study with a specific requirement to evaluate whether the thermal plume attracts fish. The Discharger is currently developing the study with consultation with staff from the Department of Fish and Game, US Fish and Wildlife Service, and National Marine Fisheries Service.

- c. *The Permit attempts to justify a mixing zone based on the fact that "an acute toxicity effluent limitation that requires compliance to be determined based on acute bioassays using 100% effluent." This ignores the fact that acute toxicity testing shows the discharge is toxic.*

The Adopted Permit does not allow lethality in the 100% effluent, let alone the mixing zone, as required by the acute toxicity effluent limit, which requires compliance using 100% effluent in the acute bioassays. The fact that the discharger has in the past failed to comply with the acute toxicity effluent limit is irrelevant. That is a compliance and enforcement issue, not a permitting issue.

Late Revision change:

1. *CSPA contends the late revision change to the temperature Receiving Water limitation V.A.15.c., as shown in underline/strikeout format below, significantly relaxes the thermal plan requirements:*

²²⁰ Results of November 2007 Dye Study of Effluent Discharge to the Sacramento River at Freeport, California, Flow Science Inc., 9 June 2008 (pgs. 16-17) (SRCSD_OTHER_101)

²²¹ USEPA's Technical Support Document for Water Quality-based Toxics Control, EPA/505/2-90-001, March 1991 (TSD)

²²² USEPA Water Quality Handbook, Chapter 5, page 5

"c. The discharge shall not cause the receiving water surface temperature to increase more than 4°F above ambient temperature of the receiving water at any time or place outside the initial zone of dilution."

CSPA contends that there is a significant difference between the surface water and the water surface. The modification to apply the thermal plan only at the water's surface does not comply with the thermal plan.

The Central Valley Water Board's interpretation of the Thermal Plan in Section 5.A.(1)c., is that the 4°F change in temperature is of the receiving water surface, not any place in the receiving water (which could be right at the point of discharge at the bottom of the river in the case of the SRWTP). In Section 5.A.(1) of the Thermal Plan, when referring to the receiving water, the term "surface" water is only used in requirement "c." Section 5.A.(1) of the Thermal Plan states the following (**emphasis added**):

(1) *Elevated temperature waste discharges shall comply with the following:*

- a. *The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F.*
- b. *Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.*
- c. *No discharge shall cause a **surface** water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.*
- d. *Additional limitations shall be imposed when necessary to assure protection of beneficial uses.*

The Central Valley Water Board interprets this as meaning the "water surface", not the "surface water", which can be synonymous with the "receiving water." Furthermore, an additional requirement of the Thermal Plan applicable to this discharge is that the maximum effluent temperature shall not exceed the natural receiving water temperature by more than 20°F. These two requirements would not be congruent using CSPA's interpretation that the temperature of the water is not to change by 4°F. It is not possible to comply with a 4°F receiving water temperature change if the discharge were 20°F greater than the natural receiving water temperature. Therefore the Central Valley Water Board concludes that the 4°F change requirement applies at the water surface (see also the response to #3, above).

CONTENTION B. The Permit, Finding P, page 11, regarding endangered species protection should be modified to state that the discharge of toxic constituents in toxic concentrations will continue for 10 years, which may result in the "taking" of endangered species.

Section 7 of the Endangered Species Act (ESA) applies to actions by federal agencies. NPDES permits are issued under state law, pursuant to a program that USEPA has certified as meeting the requirement of the Clean Water Act. The NPDES program is an "in lieu" program. USEPA did not "delegate" its authority to the state. There is no requirement in the approved program or the CWA that regional boards comply with other federal laws, such as the ESA, in adopting NPDES permits. Neither the delegation nor program funding assistance that the Water Boards receive from USEPA, are substantial enough to deem the state to be acting as a federal agency for purposes of the ESA. (See, e.g., *National Wildlife Federation v. Coleman* (5th Cir. 1976) 529 F.2d 359 [90% federal funding, extensive federal involvement with project].)

The Central Valley Water Board has no jurisdiction to authorize a "take" or regulate endangered species; only the Department of Fish and Game may do so. (CA. Fish & Game Code, §§ 37, 39, 2080.1(c), 2081, 2081.1.). The Adopted Order is in accordance with the Basin Plan and the Bay-Delta Plan which identify the beneficial uses of the Sacramento River and the Delta and include objectives for endangered species protection. Additionally, Finding P of the Adopted Order states:

"Endangered Species Act. This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state. The discharger is responsible for meeting all requirements of the applicable Endangered Species Act."

Therefore, the Order explicitly does not authorize a take. Any obligation to acquire a take permit from the Department of Fish and Game is the Discharger's responsibility. Engaging in any take without obtaining necessary permits would be a violation of the Central Valley Water Board's NPDES permit, and enforcement authorities would respond accordingly if it were to occur.

The Central Valley Water Board complied with the endangered species-related notice requirements by providing notice of the tentative Order to the Department of Fish and Game (DFG)²²³, the United States Fish and Wildlife Service (USFWS), and the United States Department of Commerce, National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NFMS)^{224,225}. NPDES regulations (40 C.F.R.

²²³ Comments on SRCSD Tentative Permit from Chad Dibble, Department of Fish and Game. (SRCSD_CORR_0937)

²²⁴ Letter from National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) regarding recommendations about SRCSD request for Thermal Plan Exemption (SRCSD_CORR_0747)

²²⁵ Letter from NOAA to Central Valley Water Board comments (SRCSD_CORR_2126)

§124.10(c)(1)(iii), (c)(1)(iv) and (e)) require the permitting agency to provide notice of the permit and draft permit documents. The Adopted Order contains requirements that are in accordance with comments received from these agencies.

The Discharger submitted a *Sacramento Regional Wastewater Treatment Plant Infeasibility Analysis and Compliance Schedule Justifications* on 19 August 2010.²²⁶ This analysis included a schedule for construction of facilities required to comply with the Permit. The Discharger will need to construct pilot facilities to determine which treatment processes will meet the requirements of the Permit. The facilities that will be constructed will be substantial and will require very tight coordination between construction contracts and very tight scheduling. Added to these construction issues is the reality that the wastewater treatment plant must continue to operate and meet permit requirements. The ten-year schedule, which includes planning, design, and construction, is as short as possible. In response to stakeholders concern regarding discharge of ammonia during the 10-year compliance schedule, the Central Valley Water Board included a maximum daily, average weekly, and monthly interim limits for ammonia as described in Section A.2 of the Adopted Order.

In addition to the above, the Discharger must submit a Pollution Prevention Plan for ammonia as required by Section VI. Provisions, C. (7) (b). Compliance Schedule for final Effluent Limitations for ammonia. The plan must evaluate what steps can be taken to reduce ammonia through treatment optimization, eliminating high ammonia side streams, etc before the construction of treatment facilities.

CONTENTION C. The Permit fails to list bis (2-ethylhexyl) phthalate in the Emergency Planning and Community Right to Know Act assessment.

Central Valley Water Board staff reviewed the Toxicity Release Inventory (TRI) database and summarized these constituents in the Fact Sheet, Section III.C.7. Emergency Planning and Community Right to Know Act (EPCRA), of the Adopted Permit. The TRI database²²⁷ did not list bis(2-ethylhexyl)phthalate as a constituent discharged off-site or into the Discharger's collection system. Consequently, it was not discussed in Section III.C.7 of the Fact Sheet. However, the Adopted Permit does contain bis(2-ethylhexyl)phthalate final effluent limitations because concentrations in the effluent demonstrate that the discharge may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above the most stringent numeric water quality objective for bis(2-ethylhexyl)phthalate, pursuant to Section 13263.6 of the California Water Code.

CONTENTION D. Effluent Limitations for aluminum and specific conductivity (EC) are improperly regulated as an annual average contrary to Federal Regulations 40 CFR 122.45 (d)(2).

Aluminum. The Adopted Permit contains aluminum effluent limitations as a maximum daily, a monthly average, and an annual average. Combined, these aluminum effluent

²²⁶ LWA, SRWTP Infeasibility Analyses and Compliance Schedule Justifications (SRCSD_OTHER_183)

²²⁷ EPCRA (SRCSD_DATA_042 & 043)

limitations are more stringent than required by federal regulations, but necessary to protect the beneficial uses of the receiving water. The average monthly and maximum daily effluent limitations are based on USEPA's National Recommended Ambient Water Quality Criteria for protection of freshwater aquatic life for aluminum to protect the beneficial uses of the receiving water. The annual average effluent limitation for aluminum is based on the Secondary Maximum Contaminant Level (MCL) for protection of human health. Secondary MCLs are drinking water standards contained in Title 22 of the California Code of Regulations. For Secondary MCLs, Title 22 requires compliance with these standards on an annual average basis, when sampling at least quarterly. Since water that meets these requirements on an annual average basis is suitable for drinking, it is impracticable to calculate average weekly and average monthly effluent limitations because such limits would be more stringent than necessary to protect the MUN beneficial use. Central Valley Water Board has determined that an averaging period similar to what is used by California Department of Public Health for those parameters regulated by Secondary MCLs is appropriate, and that using shorter averaging periods is impracticable because it sets more stringent limits than necessary.

Electrical Conductivity (EC). There are no USEPA water quality criteria for the protection of aquatic organisms for EC. However, the Basin Plan contains a chemical constituent objective that incorporates State MCLs, contains a narrative objective, and contains numeric water quality objectives for EC in the Sacramento River at Emmatton (see Tables F-13 and F-14 of the Adopted Permit, pgs F-48 and F-49). Central Valley Water Board staff conducted a reasonable potential analysis that used USEPA's recommended mass-balance approach to determine the expected critical downstream receiving water concentration.²²⁸ As detailed in the Fact Sheet of the Adopted Permit (pages F-48 – F-51), the maximum instream EC concentration is less than all applicable water quality standards for EC, and therefore, there is no reasonable potential for the discharge to cause or contribute to an instream excursion. However, due to concerns regarding the salinity loading to the Sacramento-San Joaquin Delta, the Adopted Permit contains a performance-based effluent limitation as an annual average to cap the discharge of salt to the Delta. An annual average limit is appropriate, because the purpose of the limit is to cap the discharge of salinity. A shorter averaging period is not necessary, because intermittent daily spikes are not a concern for this discharge. Short-term spikes were considered in the reasonable potential analysis and it was determined that there is no reasonable potential to cause or contribute to an instream excursion of the applicable water quality objectives.

CONTENTION E. The Permit fails to contain mass-based effluent limits as required by Federal Regulations 40 CFR 122.45(b).

40 CFR 122.45(f) states the following:

"Mass limitations. (1) All pollutants limited in permits shall have limitations, standards or prohibitions expressed in terms of mass except:

(i) For pH, temperature, radiation, or other pollutants which cannot appropriately be

²²⁸ USEPA NPDES Permit Writer's Manual, September 2010 (Section 6.3) (SRCSD_OTHER_401)

expressed by mass;

(ii) When applicable standards and limitations are expressed in terms of other units of measurement; or

(iii) If in establishing permit limitations on a case-by-case basis under §125.3, limitations expressed in terms of mass are infeasible because the mass of the pollutant discharged cannot be related to a measure of operation (for example, discharges of TSS from certain mining operations), and permit conditions ensure that dilution will not be used as a substitute for treatment.

(2) Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations."

40 CFR section 122.45(f)(1)(ii) states that mass limitations are not required when applicable standards are expressed in terms of other units of measurement. The numerical effluent limitations in the Adopted Permit are based on water quality standards and objectives. These are expressed in terms of concentration. Pursuant to 40 CFR 122.45(f)(1)(ii), expressing the effluent limitations in terms of concentration is in accordance with federal regulations.²²⁹

However, mass limitations for oxygen demanding substances, bioaccumulative substances, and constituents with an associated 303(d) listing are included in the Adopted Permit. The Adopted Permit specifically includes mass limitations for 1) BOD₅, TSS, and ammonia since they are oxygen demanding substances, and 2) mercury since it is a bioaccumulative constituent with an associated TMDL. The mass limitations are based on the design flow of 181 mgd as footnoted in Table 6 of the Permit. For those pollutant parameters for which effluent limitations are based on water quality standards and objectives that are concentration-based, mass-based effluent limitations based on the design flow are not included in the Adopted Permit in accordance with 40 CFR 122.45(f)(ii).

CONTENTION F. The Permit fails to contain an Effluent Limitation for aluminum in accordance with Federal Regulations 40 CFR 122.44, US EPA's interpretation of the regulation, and California Water Code, Section 13377.

The chronic criterion (87 µg/L as a 4-day average) recommended by the USEPA Ambient Water Quality Criteria for Aluminum is based on studies conducted on waters with low pH (6.5 to 6.8 pH units) and hardness (<10 mg/L as CaCO₃), which are conditions not commonly observed in the Sacramento River. Consequently, the criterion is likely overly protective for this application. For similar reasons, the Utah Department of Environmental Quality (Department) only applies the 87 µg/L chronic criterion for aluminum where the pH is less than 7.0 and the hardness is less than 50 mg/L as CaCO₃ in the receiving water after mixing. For conditions where the pH equals or exceeds 7.0 and the hardness is equal to or exceeds 50 mg/L as CaCO₃, the

²²⁹ See also USEPA's NPDES Permit Writers' Manual, September 2010 (pgs. 5-7 to 5-8) (SRCSD_OTHER_401)

Department regulates aluminum based on the 750 µg/L acute criterion. In the case of Sacramento River the available data indicates that the pH ranges from 6.4 to 8.8 standard units with the median at 7.6 standard units, and hardness values that range from 26 to 100 mg/L with a median of 58 mg/L as CaCO₃. It is likely that application of the stringent chronic criteria (87µg/L) is overly protective. Therefore, using best professional judgment, only the acute criterion (750 µg/L) was applied in the Adopted Permit.

The crux of CSPA's contention is that the Central Valley Water Board has circumvented the legal water quality standards development process and applied the recommended water quality levels for Utah in NPDES permits. This claim is misplaced. The Central Valley Water Board is not specifically adopting the "Utah" criteria as a condition in only applying the acute criterion of 750 micrograms per liter in the Adopted Permit. It is appropriate, as the Central Valley Water Board has done in this case, to use its best professional judgment to establish an acute criterion of 750 micrograms per liter to interpret the narrative toxicity standard in the Basin Plan. This approach was based upon applying EPA-recommended aluminum criteria as an interpretation of the narrative toxicity standard in the Basin Plan.

CONTENTION G. The Central Valley Regional Water Board (Region 5) NPDES Permits establish Effluent Limitations for metals based on the hardness of the effluent and/or the downstream water and rarely use the ambient upstream receiving water hardness as required by Federal Regulations, the California Toxics Rule (CTR, 40 CFR 131.38(c)(4)).

The Adopted Permit has established the criteria for hardness-dependant metals based on the reasonable worst-case estimated ambient hardness as required by the SIP, the CTR, and Order No. R5-2008-0008 (hereafter "Davis Order"). The SIP and the CTR require the use of "receiving water" or "actual ambient" hardness, respectively, to determine effluent limitations for these metals. (SIP, § 1.2; 40 CFR § 131.38(c)(4), Table 4, note 4.) The CTR does not define whether the term "ambient," as applied in the regulations, necessarily requires the consideration of upstream as opposed to downstream hardness conditions. Therefore, the State Water Board concluded that where reliable, representative data are available, the hardness value for calculating criteria can be the downstream receiving water hardness, after mixing with the effluent (Davis Order, p. 7).

In the Davis Order, the State Water Board points out that the requirements for selecting the appropriate hardness for calculating the CTR metals criteria is conflicting in the CTR and the SIP. (Id. at p.6) The CTR requires that the hardness values used must be consistent with the design discharge conditions for design flows and mixing zones (e.g., 1Q10 and 7Q10 receiving water low flows); whereas, the SIP's steady-state method requires the selection of critical or worst-case parameters. These can be in conflict for hardness, because often in receiving waters the critical worst-case hardness conditions do not coincide with the design low flow conditions. The lowest hardness conditions typically occur during high river flows, due to the low hardness in surface runoff from precipitation or snowmelt. The State Water Board concluded that, "Thus, the regional water boards have considerable discretion in the selection of hardness. Regardless of which method is used for determining hardness, the selection must be protective of

water quality criteria, given the flow conditions under which the particular hardness exists." (Ibid).

In the Adopted Permit, the reasonable worst-case estimated downstream ambient hardness was used for calculating the CTR criteria. As shown in the Adopted Permit, Tables F-6 through F-8, the calculated CTR criteria are protective under all discharge and flow conditions assuming reasonable worst-case conditions for upstream ambient hardness and metals concentrations.

CSPA contends that the upstream ambient receiving water hardness must be used to calculate the CTR metals criteria. The approach used in the Adopted Permit establishes the hardness based on the downstream mixed hardness. Downstream hardness is appropriate, because the effluent includes metals and hardness. It is impossible to discharge one without the other. Not considering the hardness of the effluent can result in toxicity as the discharge mixes with the receiving water.

CSPA quotes the CTR with regards to a concern when an effluent raises the hardness of the receiving watering. It states, "*A hardness equation is most accurate when the relationship between hardness and the other important inorganic constituents, notably alkalinity and pH, are nearly identical in all of the dilution waters used in the toxicity tests and in the surface waters to which the equation is to be applied. If an effluent raises hardness but not alkalinity and/or pH, using the lower hardness of the downstream hardness might provide a lower level of protection than intended by the 1985 guidelines.*" (Federal Register, Volume 65, No. 97/Thursday, May 18th 2000 (31692))

CSPA asserts this means that the upstream receiving water hardness must be used in the CTR equations. Effluents from municipal wastewater treatment plants have similar characteristics to the receiving water with regard to the relationships between hardness, alkalinity, and pH. Municipal wastewater treatment plants must maintain neutral pH and sufficient alkalinity for the biological processes to work properly, especially for nitrification. Therefore, the condition that the CTR warns against is not present in municipal wastewater treatment plant effluent. This language in the CTR confirms that "ambient" may be defined as downstream of the discharge after mixing with the effluent, thus, the use of downstream mixed hardness is appropriate under these conditions as the State Water Board found in the Davis Order.

CSPA takes the State Water Board's quotes out of context in the Davis Order (WQ 2008-0008). For the City of Davis NPDES permit, the upstream receiving water hardness was used. However, in the City of Davis NPDES permit the use of the lowest hardness during low flows was used, rather than the lowest hardness during all flow conditions. The State Water Board found that in order to account for acute conditions that may occur even during high flows, the Central Valley Water Board must consider the hardness of the receiving water during all flow conditions, high and low. CSPA takes this statement as a requirement to only use the upstream receiving water hardness. However, the State Water Board actually concluded that where reliable, representative data are available, the hardness value for calculating criteria can be the downstream receiving water hardness, after mixing with the effluent (Davis Order, p. 7).

CSPA contends that since a lower effluent limit would be required using the minimum observed upstream ambient hardness to calculate the CTR criteria, that this means a

mixing zone and dilution is required. This is not accurate. Although a lower effluent limit can be calculated, dilution is not needed. The criteria are dependent on hardness, so the criteria changes as the hardness changes downstream. A mixing zone is a zone near the point of discharge where criteria are not met. A mixing zone is needed when the effluent exceeds criteria and requires mixing and dilution with the receiving water before the criteria are met. As shown in Tables F-6 through F-8 of the Fact Sheet (Attachment F), considering the known conditions and using reasonable worst-case assumptions, the effluent does not exceed the criteria and any mixture of effluent and receiving water does not exceed the criteria. A mixing zone is therefore not necessary in this situation.

CSPA further provides a discussion of the biological opinion from the US Fish and Wildlife Service and National Marine Fisheries Service on the promulgation of the CTR. Because the biological opinion was submitted on the proposed CTR rulemaking, USEPA would have considered the specific comment in the development of the final rulemaking of the CTR. Therefore, these comments by CSPA are directed at the CTR, not the Adopted Permit, which must comply with the final CTR and SIP. In addition, the biological opinion is not in the record for this permitting action. Central Valley Water Board staff properly applied the SIP and CTR when establishing WQBELs for the CTR metals with hardness-dependent criteria.

CONTENTION H. The Regional Board failed to use the most current criteria for copper resulting in the Permit containing an inadequate effluent limitation in accordance with 40 CFR 122.44.

Copper is a CTR priority pollutant. The CTR contains water quality criteria for copper based on hardness, and also contains conversion factors and water effects ratios (WER) to adjust the copper criteria. The default WER within the CTR is not outdated. For pollutants listed in the CTR, such as copper, the SIP establishes a step-by-step procedure for determining reasonable potential and developing water quality-based effluent limitations (WQBELs). Central Valley Water Board staff properly applied the CTR and SIP, following current guidance and direction from US EPA when establishing the WQBELs for the copper in the tentative NPDES Permit.

As CSPA commented, USEPA has also promulgated an objective for copper based on the Biotic Ligand Model (BLM) (*Aquatic Life Ambient Freshwater Quality Criteria—Copper 2007 Revision*). The BLM cannot be used in developing WQBELs in NPDES permits; a Basin Plan amendment allowing adjustment of an established criterion must be completed, or USEPA must change the CTR. Therefore, these comments by CSPA are directed at the CTR, not the Adopted Permit, which must comply with the final CTR and SIP.

CONTENTION I. The Permit fails to contain a protective Effluent Limitation for copper in violation of the California Toxics Rule, Federal Regulations (40 CFR 122.44), the California Water Code (CWC), Section 13377 and the State's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).

As previously stated in the response to CSPA's Contention G and H, and as shown in Tables F-6 through F-8 in the Fact Sheet of the Adopted Permit, the copper effluent limitations are protective under all discharge and flow conditions assuming worst-case conditions for upstream ambient hardness and metals concentrations. The Central Valley Water Board properly applied the SIP and CTR when establishing WQBELs for the CTR metals with hardness-dependent criteria.

CONTENTION J. The Permit fails to contain an Effluent Limitation for lead in violation of the California Toxics Rule, Federal Regulations (40 CFR 122.44), the California Water Code (CWC), Section 13377 and the State's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).

There is no reasonable potential for the discharge to cause or contribute to an excursion of the CTR criteria for lead. Lead is a CTR hardness-dependant metal. As previously explained in the response to CSPA's Contention G, and as detailed in the Fact Sheet, the Adopted Permit has established the criteria for CTR hardness-dependant metals based on the reasonable worst-case downstream ambient hardness as required by the SIP, the CTR, and Order R5-2008-0008 (City of Davis). In this case for lead, two effluent concentration allowance calculations were used, one based on the minimum observed upstream receiving water hardness and one based on the maximum observed upstream receiving water hardness. Lead in the discharge does not exhibit reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life. Therefore, the Adopted Permit appropriately does not contain an effluent limitation for lead.

CONTENTION K. The Permit fails to contain an Effluent Limitation for zinc in violation of the California Toxics Rule, Federal Regulations (40 CFR 122.44), the California Water Code (CWC), Section 13377 and the State's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).

There is no reasonable potential for the discharge to cause or contribute to an excursion of the CTR criteria for Zinc. Zinc is a CTR hardness-dependant metal. As previously explained in the Response to CSPA's Contention G, and as detailed in the Fact Sheet, the Adopted Permit has established the criteria for CTR hardness-dependant metals based on the reasonable worst-case downstream ambient hardness as required by the SIP, the CTR, and Order R5-2008-0008 (City of Davis). Zinc in the discharge does not exhibit reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life. Therefore, the Adopted Permit appropriately does not contain an effluent limitation for zinc.

CONTENTION L. The Permit fails to implement the requirements of the Basin Plan, Implementation Policy for Application of Water Quality Objectives with regard to additive toxicity.

The Central Valley Water Board acknowledges the potential impact to aquatic life and human health as a result of additive toxicity. This impact would particularly be expected when discharges of the pollutants of concern (e.g., copper, lead, and zinc) are discharged at the same time and at levels that exceed applicable water quality objectives during critical low flow times. An accurate evaluation of additive toxicity would therefore require extensive data collection and analysis that would include many assumptions. Alternatively, the Central Valley Water Board uses several mechanisms within a permit to protect against toxic and carcinogenic effects. For this discharger the Central Valley Water Board established WQBELs designed to be protective of receiving water quality (based on applicable water quality objectives established to protect against acute and chronic toxicity and human health carcinogenicity). In addition, the Central Valley Water Board required weekly acute whole effluent toxicity (WET) testing and monthly chronic WET testing designed specifically to determine whether the combination of pollutants contained in a discharge result in acute or chronic toxic effects both in 100% effluent and when diluted with receiving water.

CONTENTION M. The Permit contains an inadequate reasonable potential analysis by using incorrect statistical multipliers as required by Federal regulations, 40 CFR § 122.44(d)(1)(ii).

Until adoption of the State Water Board's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP), USEPA's *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001, March 1991 (TSD) was the normal protocol followed for permit development for all constituents. The SIP is required only for California Toxics Rule (CTR) and National Toxics Rule (NTR) constituents and prescribes a different protocol when conducting a reasonable potential analysis (RPA), but is identical when developing water quality based effluent limitations (WQBELs). For some time after SIP adoption, SIP protocols were used for CTR/NTR constituents, and TSD protocols were used for non-CTR/NTR constituents. While neither protocol is necessarily better or worse in every case, using both protocols in the same permit has led to confusion by dischargers and the public, and to greater complexity in writing permits. Currently there is no State Water Board or Central Valley Water Board policy that establishes a recommended or required approach to conduct an RPA or establish WQBELs for non-CTR/NTR constituents. However, the State Water Board has held that the Central Valley Water Board may use the SIP as guidance for water quality-based toxics control. (See, e.g., *In the Petition of Yuba City*, WQ Order No. 2006-0013 at p. 4.) The SIP states in the introduction "The goal of this Policy is to establish a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency." Therefore, for consistency in the development of NPDES permits, the Central Valley Water Board has implemented the RPA procedures from the SIP to evaluate reasonable potential for both CTR/NTR and non-CTR/NTR constituents (except electrical conductivity, see response to Contention O, below).

40 CFR § 122.44(d)(ii) states that a reasonable potential analysis must account for "the variability of the pollutant or pollutant parameter in the effluent ...". The reasonable potential analysis is based on data the discharger submits with the renewal application. The samples themselves must be representative of the seasonal variation in the discharge. (40 CFR § 122.21(j)(4)(vi), (vii), (ix).) Other than requiring representative data, the regulations do not establish any particular methodology for accounting for pollutant variability. The supporting documentation for the SIP demonstrates that the SIP RPA methodology accounts for pollutant variability, albeit in a different manner than the TSD does. (*Final Functional Equivalent Document for Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Phase 1 of the Inland Surface Waters Plan and the Enclosed Bays and Estuaries Plan)* (approved 2 March 2000), pp. V-5 – V-22.) EPA has reviewed the SIP on numerous occasions and has the opportunity to review all NPDES permits issued in California, including the subject permit. (*NPDES Memorandum of Agreement Between USEPA and State Water Board* (1989).)

CONTENTION N. The Permit contains a compliance time schedule to meet the discharge limitations for BOD, TSS, ammonia, coliform organisms, chlorine and chlorpyrifos that exceeds the requirements of the Basin Plan.

The Adopted Permit contains new effluent limitations for ammonia and chlorpyrifos, and more stringent effluent limitations for BOD, TSS, and coliform organisms. On 20 August 2010, the Discharger submitted a request and justification for a compliance schedule that is as short as practicable to implement actions to secure financing, designing, and constructing new facilities, or implementing new or expanded programs, to comply with these limitations. Based upon the Discharger's compliance schedule justification, the Adopted Permit includes an appropriate compliance schedule that complies with the State Water Board's Policy for Compliance Schedules in NPDES Permits (Resolution No. 2008-0025) and the Basin Plan. Upon further review of chlorpyrifos requirements in the Basin Plan, it was determined that the compliance schedule for chlorpyrifos is not allowed in the permit and as a corrective measure was moved to the adopted Time Schedule Order as a late revision.

CONTENTION O. The Permit fails to contain an adequate effluent limitation for electrical conductivity (EC) in violation of federal regulation 40 CFR 122.44.

There is no reasonable potential for electrical conductivity. The Basin Plan contains a chemical constituent objective that incorporates state MCLs, contains a narrative objective, and contains numeric water quality objectives for EC. There are no USEPA water quality criteria for EC; therefore, the SIP protocols to conduct a reasonable potential analysis (RPA) or establish WQBELs are not required. However, as previously discussed in response to CSPA Contention N, the Central Valley Water Board usually uses the RPA procedures from the SIP for consistency in development of the NPDES permits. But in this case, because the Sacramento River within the vicinity of the discharge has significant flows to dilute and mix the effluent discharge (See Section IV.C.2.d. of the Fact Sheet in the Adopted Permit) and assimilative capacity for EC or TDS (e.g. average receiving water concentration for EC and TDS were 160 µmhos/cm and 98 mg/L, respectively), the Central Valley Water Board found that a

site-specific condition analysis is more appropriate than the SIP's general procedures. USEPA allows a RPA conducted with "available effluent data and a water quality model," and as described in detail in the section IV.C.3.c of the Fact Sheet, Central Valley Water Board staff used USEPA's recommended mass-balance water quality model approach to determine the expected critical downstream receiving water concentrations. Based on the results of USEPA's approved RPA method, the discharge does not exhibit reasonable potential to cause or contribute to an in-stream excursion of water quality objectives for EC or TDS. The Adopted Permit contains a performance-based EC effluent limitation to limit the discharge to current salinity levels.

CONTENTION P. The Permit fails to contain an effluent limitation for total dissolved solids (TDS) in violation of federal regulation 40 CFR 122.44.

See Response to CSPA Contention O. TDS and EC are both measurements of salinity. There is no reasonable potential for either TDS or EC to cause or contribute to an exceedance of the applicable water quality objectives in the receiving water. It was decided that a performance-based limit for EC was adequate to cap the discharge salinity.

CONTENTION Q. The Permit fails to meet the preconditions necessary to exempt waste storage, treatment and disposal ponds from California Code of Regulations Title 27 and fails to implement the requirements of CCR Title 27.

The Discharger's emergency storage basins B and C (ESB-B and ESB-C) are exempt from the requirements of Title 27, pursuant to Title 27 CCR section 20090(a). Exemption 20090(a) Sewage states:

"Discharges of domestic sewage or treated effluent which are regulated by WDRs . . . , or for which WDRs have been waived, and which are consistent with applicable water quality objectives, and treatment or storage facilities associated with municipal wastewater treatment plants, provided that residual sludges or solid waste from wastewater treatment facilities shall be discharged only in accordance with [Title 27]."

The first part, *"Discharges of domestic sewage or treated effluent which are regulated by WDRs . . . , or for which WDRs have been waive...d"*, as correctly stated by CSPA, conditionally exempts the Facility's post-treatment activities provided the discharge complies with applicable water quality objectives. However, the second part, *"...and treatment or storage facilities associated with municipal wastewater treatment plants..."*, unconditionally exempts components within the treatment system. (see pgs F-13 through F-14 of the Adopted Permit)

During peak wet weather flows, untreated wastewater may be diverted to ESB-B and ESB-C to protect the treatment system from being washed-out. Untreated wastewater temporarily stored in ESB-B or ESB-C is then returned to the treatment systems headworks for treatment before being discharged. Thus, ESB-B and ESB-C are a necessary part of the wastewater treatment system and qualify for exemption from the requirements of Title 27 pursuant to 27 CCR section 20090(a). Therefore, ESB-B and

ESB-C do not need to meet the preconditions of the first part of exemption 20090(a) to qualify for the Title 27 exemption.

CONTENTION R. The Permit contains an allowance for a mixing zone that does not comply with the requirements of Federal Regulation 40 CFR Section 131.12 (a)(1) and the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) or the Basin Plan.

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The mixing zones and dilution credits allowed in the Adopted Permit are in compliance with federal regulations, the SIP, and the Basin Plan; and are adequately protective of the beneficial uses of the receiving water. In summary, the aquatic toxicity mixing zones allowed in the Adopted Permit are as small as practicable, will not compromise the integrity of the entire water body, restrict the passage of aquatic life, dominate the water body or overlap existing mixing zones from different outfalls. The acute mixing zone has been defined, but the Adopted Permit does not allow acute dilution credits for development of water quality-based effluent limits. See response to the District's petition, Section IX, above. The chronic aquatic life mixing zone is 400 feet wide and extends 350 feet downstream of the diffuser, and the human health mixing zone extends downstream of the discharge where complete mixing occurs, which is approximately 3 miles downstream of the discharge. The nearest downstream drinking water intake is about 40 miles downstream of the discharge, which is 37 miles from the end of the mixing zone. The mixing zones and dilution credits are discussed in detail in the Fact Sheet in Section IV.C.2.d.

The Discharger's consultant, Flow Sciences Incorporated, developed a dynamic model that consists of five models linked in series: 1) U.S. Bureau of Reclamation's Project Simulation Model, PROSIM, and Temperature Models; 2) Fischer Delta Model, FDM; 3) Flow Science's Computation Fluid-Dynamics Model, FLOWMOD; 4) Flow Science's Longitudinal Dispersion Model, LD; and 5) U.S. EPA's Dynamic Toxicity Model, DYNTOX. Additionally, the Discharger performed several field validation studies to corroborate the effectiveness of the modeling tools in representing water quality conditions in the Sacramento River. Due to the complexity of the mathematical models, the Central Valley Water Board used the services of Tetra Tech, a USEPA contractor, to assist with the review of the dynamic model. Tetra Tech's modeling experts concluded that the model study was conducted in a sound and scientifically defensible manner. The modeling experts determined that the linked dynamic modeling system is capable of providing an accurate probabilistic representation of receiving water quality conditions.²³⁰

The chronic aquatic life and human health mixing zones meet the requirements of the SIP, and comply with the Basin Plan. Subsequently, allowance of dilution credits were evaluated on a pollutant-by-pollutant basis. The Adopted Permit allowed dilution credits for bis(2-ethylhexyl)phthalate, carbon tetrachloride, chlorodibromomethane, cyanide, dibenzo(ah)anthracene, dichlorobromomethane, manganese, methyl tertiary butyl ether, methylene chloride, pentachlorophenol, and

²³⁰ Memorandum from John Hamrick, Ph.D., P.E., D.WRE and Jon Butcher, Ph.D., P.H. Tetra Tech, to James D. Marshall, P.E. Central Valley Regional Water Quality Control Board, 30 June 2008 (see page 10) (SRCSD_CORR_2027)

tetrachloroethylene in compliance with the SIP and the Basin Plan. The resulting effluent limitations are protective of the beneficial uses of the receiving water as discussed in the Fact Sheet.

CONTENTION S. The Permit contains Effluent Limitations less stringent than the existing permit, contrary to the Antidegradation requirements of the Clean Water Act and Federal Regulations, 40 CFR 122.44 (I)(1).

The RPA was based on monitoring data collected from June 2005 through July 2008, which constitutes monitoring data that was not available at the time Order 5-00-188 was issued. Based on this updated monitoring data, chloroform, lindane, silver, lead, zinc, and cyanide do not exhibit reasonable potential to cause or contribute to an exceedance of water quality objectives in the receiving water. Therefore, relaxation of effluent limitations is allowed under CWA section 402(o)(2)(B)(i), which allows for relaxation where information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance. CWA section 303(d)(4) allows for less stringent limitations in waters attaining water quality standards if the relaxation is consistent with antidegradation requirements. New information that was available at the time of adoption of the Adopted Permit demonstrates that the discharge does not have the reasonable potential to cause or contribute to an exceedance of water quality standards for these parameters in the receiving water and all beneficial uses will be maintained; therefore the relaxation/removal of the limitations is in accordance with federal anti-backsliding regulations.

CONTENTION T. The Permit carries forth a Thermal Plan exemption that degrades the aquatic life beneficial use of the receiving stream, the Sacramento River.

The Central Valley Water Board consulted with the Department of Fish and Game (DFG), the United States Fish and Wildlife Service (USFWS) and the United States Department of Commerce, National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NMFS) on the District's request for an expanded Thermal Plan Exception. The Discharger's request for the proposed Thermal Plan Exception, with new thermal requirements, was not supported by these fishery agencies, and the Discharger's proposed new Thermal Plan Exception were not incorporated in the Adopted Permit. The fishery agencies recommended the current Thermal Plan Exception requirements from the existing NPDES permit be carried over to the Adopted Permit with the requirement for fishery studies to confirm the requirements are protective of beneficial uses. The fishery agencies also recommended that the Discharger immediately plan to address future increases in the discharge without the need for Thermal Plan exceptions. The Adopted Permit requires the Discharger to conduct a temperature study that requires an evaluation of: (1) the existing Thermal Plan Exception and its effects on aquatic life, and (2) any proposed request for new Thermal Plan Exception(s). Furthermore, the Discharger must consult with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Game, to consider additional issues (such a fish attraction to

mixing zone areas) in development of the workplan for the Study. Meetings to develop the workplan are being held.

CONTENTION U. The Permit fails to assess compliance and require compliance with the Receiving Water Limitation for Toxicity, which is based on the Basin Plan narrative toxicity water quality objective.

CSPA contends that from recent scientific investigations and literature it is reasonable to conclude that constituents of emerging concern (CECs) are present in the discharge at levels that threaten to violate the receiving water limitation for toxicity.

Pharmaceuticals, personal care products, and endocrine disrupting chemicals are labeled as Constituents of Emerging Concern (CECs). These include prescription and nonprescription drugs, soaps, fragrances, hair spray, finger nail polish, cosmetics, oral contraceptives, insect repellent, sunscreen, etc. With advances in analytical chemistry it may be possible to detect these chemicals in treated wastewater, but there are no USEPA approved analytical methods. Furthermore, because little is known about the human health and the aquatic toxicity effects of emerging contaminants, there are currently no water quality objectives/criteria for these constituents, or any way to develop numeric interpretations of narrative water quality objectives. Monitoring was not required in the Adopted Permit, due to no water quality objectives/criteria and the lack of EPA approved analytical testing methods.

In Order WQ 2009-0012, City of Stockton, the State Water Board found the following regarding CECs on page 9:

"The issue of pharmaceuticals and other emerging contaminants is of concern to this Board. In September 2008, we held a workshop to discuss and encourage reduction of pharmaceutical waste discharges to POTWs. At this point in time, however, the science is too uncertain to require each POTW to monitor for a host of materials that have the potential to be found in its discharge. The Central Valley Water Board acted appropriately by including a reopener provision to allow for coordinated monitoring of emerging constituents under a regional program."

Since the State Water Board's decision for Stockton, the State Water Board has been developing monitoring requirements for CEC's for the Recycled Water Policy. However, the work is still ongoing and does not address surface water. The Adopted Permit includes a reopener provision that allows the permit to be reopened for addition of monitoring or special studies of CEC's in the treatment plant discharge should new information become available.

CONTENTION V. The Permit contains an inadequate antidegradation analysis that does not comply with the requirements of Section 101(a) of the Clean Water Act, Federal Regulations 40 CFR § 131.12, the State Board's Antidegradation Policy (Resolution 68-16) and California Water Code (CWC) Sections 13146 and 13247.

CSPA's contention is the antidegradation analysis conducted by Larry Walker and Associates does not meet State and Federal requirements. The antidegradation

analysis submitted by the Discharger was for the incremental increase between 181 mgd and 218 mgd. Subsequently, the Discharger withdrew its plans for expansion. The Central Valley Water Board conducted its own antidegradation analysis based on 181 mgd and included an antidegradation finding in the Adopted Permit for the subject permit renewal action.

Compliance with Clean Water Act section 101(a) and the state and federal anti-degradation requirements are covered in response to the SRCSD Statement of Points and Authorities, Section VII. The reference in failing to comply with Water Code section 13146 and 13247 presumes that the Central Valley Water Board has failed to conduct an adequate anti-degradation analysis. As noted in response to SRCSD Statement of Points and Authorities, Section VIII, the Central Valley Water Board's anti-degradation analysis and finding in the Adopted Permit is in accordance with Water Code section 13146 and 13247.

CONTENTION W. The Permit does not contain enforceable Effluent Limitations for chronic toxicity and therefore does not comply with the Basin Plan, Federal Regulations, at 40 CFR 122.44 (d)(1)(i) and the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).

The chronic toxicity issue was addressed in State Water Board Water Quality Order (WQO) 2008-0008 (City of Davis) adopted on 2 September 2008, and WQO 2003-0012 (Los Coyotes). With regard to the need for a numeric chronic toxicity effluent limit, the City of Davis Order states, "*We have already addressed this issue in a prior order and, once again, we conclude that a numeric effluent limitation for chronic toxicity is not appropriate at this time.*" (*Id.* at p. 3.)

The Adopted Permit includes a narrative chronic toxicity effluent limitation in section IV.A.1.c which reads, "*There shall be no chronic toxicity in the effluent discharge.*" This is consistent with the SIP and the Los Coyotes Order. The State Board Orders, however, do not explain how to determine compliance with the limitation. Under the most literal interpretation, a result of even 1.1 chronic toxicity units (TUc) would be a violation of the narrative limitation. Determining compliance in this manner would not be appropriate, because to do so would essentially transform the narrative limitation into a numeric limitation of 1 TUc. This is impermissible, as the State Water Board has rejected the numeric approach in the Los Coyotes Order. This interpretation would also ignore dilution, making the limitation overly stringent. Disallowing dilution is inconsistent with effluent limitations for specific priority pollutants. Further, whole effluent toxicity (WET) testing is imprecise by nature, and one sample is not necessarily indicative of chronic toxicity. For this reason, the SIP and the Los Coyotes Order rely on toxicity reduction/toxicity identification (TRE/TIE) requirements to ensure that a discharge does not cause or contribute to toxicity.

The Adopted Permit also includes compliance determination language to implement the narrative limitation, in a manner suggested by both the City of Davis and Los Coyotes Orders. This language states, "*Compliance with the accelerated monitoring and TRE/TIE provisions of Provision VI.C.2.a shall constitute compliance with the effluent limitation.*" This compliance determination language is consistent with the Los Coyotes

and City of Davis Orders, which require narrative effluent limitations for chronic toxicity and also mandate numeric benchmarks for triggering accelerated monitoring, rigorous toxicity reduction evaluation/toxicity investigation evaluation conditions; and a reopener to establish numeric effluent limitations for either chronic toxicity or the chemical(s) causing toxicity.

CSPA states that, "The *Compliance Determination* nullifies the Effluent Limitation and makes toxic discharges unenforceable." To the contrary, Central Valley Water Board implements accelerated testing and TRE/TIE requirements as an integral part of the effluent limitation, assuring consistency with the SIP and Los Coyotes Order. In the Los Coyotes Order, the State Water Board noted that best management practices (BMPs) may substitute for numeric effluent limitations when developing numeric limitations is infeasible. The State Water Board then concluded that numeric toxicity limitations are infeasible (Los Coyotes Order, pp. 9-10). The TRE/TIE is the key to addressing chronic toxicity under the Los Coyotes approach. Relying on accelerated testing and the TRE/TIE to satisfy the narrative effluent limitation is a BMP-based approach and therefore consistent with the reasoning in the Los Coyotes Order.

The State Water Board required the narrative effluent limitation in addition to BMPs because "NPDES permits must contain effluent limitations that will achieve compliance with water quality standards that have . . . reasonable potential . . ." (Los Coyotes Order, p. 9) The intent of the effluent limitation was to "ensure that the requirements to perform a TRE/TIE and to eliminate toxicity are clear and enforceable." (Los Coyotes Order, p. 10) The compliance determination language is consistent with the State Water Board's purpose for requiring the effluent limitation.

During the TRE/TIE process, the Discharger is subject to the acute toxicity effluent limitation and a chronic toxicity receiving water limitation. (Permit, section V.A.16.) Taken together, these provisions require the Discharger to promptly address any newly-discovered chronic toxicity, or the Discharger will be in violation of the permit. This is consistent with the State Water Board's permitting direction provided in its water quality orders, discussed above, regarding chronic whole effluent toxicity.

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