California Sportfishing Protection Alliance
"An Advocate for Fisheries, Habitat and Water Quality"
3536 Rainier Avenue, Stockton, CA 95204
T: 209-464-5067, F: 209-464-1028, E: deltakeep@aol.com, W: www.calsport.org

9 September 2009

Mr. Ken Landau, Assistant Executive Officer
Ms. Diana Messina, Supervising WRCE
Mr. Jim Marshall, Sr. WRCE
Ms. Gayleen Perreira, WRCE
Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6144

VIA: Electronic Submission
Hardcopy if Requested

RE: Renewal of Waste Discharge Requirements (NPDES No. CA0081558) for City of Manteca Wastewater Quality Control Facility, San Joaquin County

Dear Messrs. Landau, Marshall and Mesdames Messina and Perreira:

The California Sportfishing Protection Alliance (CSPA) has reviewed the proposed Waste Discharge Requirements (NPDES No. CA0081558) for City of Manteca Wastewater Quality Control Facility (Permit) and submits the following comments.

CSPA requests status as a designated party for this proceeding. CSPA is a 501(c)(3) public benefit conservation and research organization established in 1983 for the purpose of conserving, restoring, and enhancing the state's water quality and fishery resources and their aquatic ecosystems and associated riparian habitats. CSPA has actively promoted the protection of water quality and fisheries throughout California before state and federal agencies, the State Legislature and Congress and regularly participates in administrative and judicial proceedings on behalf of its members to protect, enhance, and restore California's degraded water quality and fisheries. CSPA members reside, boat, fish and recreate in and along waterways throughout the Central Valley, including San Joaquin County.

1. A new or expanded wastewater discharge may not be allowed into an Impaired Waterway unless all existing discharges have been identified and are subject to Compliance Schedules in accordance with 40 CFR 122.4(i).

The Discharger is expanding the Facility from the currently permitted 9.87 mgd to 17.5 mgd.

Under the Clean Water Act and the NPDES permit regulations (40 CFR 122.4(i)), when a new source seeks to obtain a permit for a discharge of pollutants to a stream segment already exceeding its water quality standards for that pollutant, no permit may be issued. An exception to this prohibition is where the new source demonstrates, before the close of the public comment period for the proposed permit, that: (1) there are sufficient remaining pollutant load allocations

for the discharge, and (2) existing dischargers in the stream segment are subject to compliance schedules designed to bring the stream segment into compliance with applicable water quality standards. The Ninth Circuit Court of Appeals has ruled in *Friends of Pinto Creek v. United States Environmental Protection Agency* that a new or expanded wastewater discharge may not be allowed into an impaired waterway *unless all existing discharges have been identified and are subject to compliance schedules*. (Emphasis added)

The Basin Plan includes a list of Water Quality Limited Segments (WQLSs), which are defined as "*…those sections of lakes, streams, rivers or other fresh water bodies where water quality does not meet (or is not expected to meet) water quality standards even after the application of appropriate limitations for point sources (40 CFR 130, et seq.)*." The Basin Plan also states, "*Additional treatment beyond minimum federal standards will be imposed on dischargers to WQLSs. Dischargers will be assigned or allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment*."

The southern portion of the Sacramento-San Joaquin Delta Waterways is listed as a WQLS for chlorpyrifos, DDT, diazinon, electrical conductivity, exotic species, group A pesticides, mercury, and unknown toxicity in the 303(d) list of impaired water bodies.

The *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (Bay-Delta Plan) was adopted in May 1995 by the State Water Board superseding the 1991 Bay-Delta Plan. The Bay-Delta Plan identifies the beneficial uses of the estuary and includes objectives for flow, salinity, and endangered species protection.

The proposed Permit, Table F-2a, shows the highest average monthly discharge of electrical conductivity (EC) was 827 umhos/cm the average monthly concentration was 731 umhos/cm (Table F-11). This level exceeds the Bay-Delta Plan water quality objective for EC of 700 umhos/cm, which is applicable from 1 April through 31 August. The proposed flow increase from 9.87 mgd to 17.5 mgd is 7.63 mgd. Other than EC, another measurement of salinity is total dissolved solids (TDS). The monthly average TDS concentration is 450 mg/l. At the proposed flow increase of 7.63 mgd the resultant increased salt load to the impaired receiving stream is 28,653 pounds per day. Sampling of the receiving stream above the point of discharge shows routine exceedance of the EC salinity standard of 700 umhos/cm; there is no assimilative capacity (F-45, EC discussion).

The Regional Board has not identified all dischargers of salinity to the Delta. The Regional Board has not issued schedules of compliance for all dischargers of salinity to the Delta. Adding an additional load of salt (28,653 pounds per day) to an impaired water body will cause harm to the Sacramento-San Joaquin Delta. In accordance with 40 CFR 144.4(i) the Regional Board may not allow the increased discharge.

2. The Discharger has degraded and polluted groundwater quality and the proposed Permit fails to comply with California Code of Regulations (CCR) Title 27 §20090. SWRCB – Exemptions (C15: §2511). The proposed Permit fails to adequately regulate the discharge of minimally treated industrial (food processing) wastes in

accordance with CCR Title 27. The Regional Board fails to recognize that if an exception to CCR Title 27 is not applicable then the regulation must be applied.

CCR Title 27 requires in part that: "The following activities shall be exempt from the SWRCB-promulgated provisions of this subdivision, so long as the activity meets, and continues to meet, all preconditions listed: (a) **Sewage—**Discharges of domestic sewage or treated effluent which are regulated by WDRs issued pursuant to Chapter 9, Division 3, Title 23 of this code, 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 the applicable SWRCB-promulgated provisions of this division. (b) **Wastewater—**Discharges of wastewater to land, including but not limited to evaporation ponds, percolation ponds, or subsurface leachfields if the following conditions are met: (1) the applicable RWQCB has issued WDRs, reclamation requirements, or waived such issuance; (2) the discharge is in compliance with the applicable water quality control plan; and (3) the wastewater does not need to be managed according to Chapter 11, Division 4.5, Title 22 of this code as a hazardous waste."

Region 5's Basin Plan, WATER QUALITY OBJECTIVES FOR GROUND WATERS, states in part that:

> "The following objectives apply to all ground waters of the Sacramento and San Joaquin River Basins, as the objectives are relevant to the protection of designated beneficial uses. These objectives do not require improvement over naturally occurring background concentrations. The ground water objectives contained in this plan are not required by the federal Clean Water Act.
>
> ***Bacteria***
> In ground waters used for domestic or municipal supply (MUN) the most probable number of coliform organisms over any seven-day period shall be less than 2.2/100 ml.
>
> ***Chemical Constituents***
> Ground waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At a minimum, ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of Section 64431, Table 64444-A (Organic Chemicals) of Section 64444, and Tables 64449-A (Secondary Maximum Contaminant Levels- Consumer Acceptance Limits) and 64449-B (Secondary Maximum Contaminant Levels-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain lead in excess of 0.015 mg/l. To protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs.

Tastes and Odors
Ground waters shall not contain taste- or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

Toxicity
Ground waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial use(s). This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances."

The proposed Permit Fact Sheet contains numerous sections that discuss groundwater, groundwater quality and compliance with CCR Title 27. The following are excerpts from the proposed Permit Fact Sheet, principally pages F-69 through 72 (underline emphasis added):

- "The Discharger's groundwater characterization study (*Background Hydrogeologic Characterization Study, 26 September 2006,* Condor Earth Technologies, Inc.) also summarized all groundwater data collected to date and concluded that "groundwater quality under beneath and down gradient of the facility appear to be of poorer quality than upgradient groundwater for total dissolved solids, nitrate, and several of the trace metals."

- Total dissolved solids, which were found to be present in the groundwater at an average concentration range from 443 mg/L to 893 mg/L, have the potential to degrade groundwater quality at this site because there is little ability for attenuation in the shallow permeable vadose zone beneath this Facility. According to Ayers and Westcot, dissolved solids can cause yield or vegetative growth reductions of sensitive crops if present in excess of 450 mg/L in irrigation water, thereby impairing agricultural use of the water resource.

- Nitrate was found to be present in the groundwater at an average concentration range from 0.04 mg/L to 24.9 mg/L as nitrogen, has the potential to degrade groundwater quality because there is little ability for attenuation in the shallow permeable vadose zone beneath the Facility. Furthermore, groundwater monitoring data show nitrate concentrations above the primary MCL of 10 mg/L in monitoring wells MW-3 and MW-5. The Chemical Constituents objective prohibits concentrations of chemical constituents in excess of California MCLs in groundwater that is designated as municipal or domestic supply. The California primary MCL for nitrate is equivalent to 10 mg/L as nitrogen, and groundwater beneath the facility is designated as municipal or domestic supply. It is therefore appropriate to adopt a numerical groundwater limitation of 10 mg/L for nitrate as nitrogen to implement the Chemical Constituents objective to protect the municipal and domestic use of groundwater.

- pH ranged from 6.7 to 7.4 standard units in the domestic wastewater and from 4.45 to 11.53 in the food processing wastewater, has the ability to degrade groundwater quality at this site because there is little potential for buffering in the shallow permeable vadose

zone. According to Ayers and Westcot, pH less than 6.5 or greater than 8.4 can cause yield or vegetative growth reductions of sensitive crops if present in irrigation water, thereby impairing agricultural use of the water resource. The applicable water quality objective to protect the agricultural use from discharges of substances that affect pH is the narrative Chemical Constituents objective, which is applied following the "Policy of Application of Water Quality Objectives" in the Basin Plan. A numerical groundwater limitation range of 6.5 to 8.4 for pH, based on Ayers and Westcot, is relevant and appropriate to apply the narrative Chemical Constituents objective to protect unrestricted agricultural use of groundwater in the absence of information to support a less protective limit.

- Ammonia has the potential to degrade groundwater quality because there is little ability for ammonia attenuation in the shallow permeable vadose zone at this site. According to Amoore and Hautala 1, who evaluated odor of ammonia in water, the odor threshold for ammonia in water is 1.5 mg/L (as NH4). These authors studied the concentration of chemicals in air that caused adverse odors and then calculated the concentration in water that would be equivalent to that amount in air. Therefore, it is appropriate to use the data contained therein to apply the narrative Tastes and Odors water quality objective. Concentrations that exceed this value can impair the municipal or domestic use of the resource by causing adverse odors. The applicable water quality objective to protect the municipal and domestic use from discharges of odor producing substances is the narrative Tastes and Odors objective, which is applied following the "Policy of Application of Water Quality Objectives" in the Basin Plan. A numerical groundwater limitation of 1.5 mg/L for ammonia (as NH4), based on Amoore and Hautala, is relevant and appropriate to apply the narrative Tastes and Odors objective to protect the municipal and domestic use of groundwater.

- Undisinfected secondary effluent is mixed with food processing waste and applied to approximately 190 acres of the Discharger-owned agricultural fields and 70 acres of Dutra Farms Inc. owned agricultural fields.

- Groundwater limitations are required to protect the beneficial uses of the underlying groundwater. Based on groundwater quality data provided by the Discharger, it appears that the Discharger cannot immediately comply with the groundwater limitations. This Order allows a time schedule for the discharge to come into compliance with the groundwater limitations. In the interim, this Order requires the Discharger to conduct a BPTC Evaluation, which is a systematic and comprehensive technical evaluation of each component of the facilities' waste management system to determine best practicable treatment or control for each the waste constituents of concern. In addition, this Order requires interim reclamation specifications that limit the seasonal average concentrations of EC, TDS, and nitrate, discharged to the agricultural fields be maintained at current facility performance.

- However, since this report, the Discharger has implemented several management practices (e.g. nitrification-denitrification facilities, biosolids now sent off-site for disposal, etc.). Thus the Discharger cannot fully evaluate actual impacts on groundwater

due to current land application practices without completion of additional studies.

- Nevertheless, this Order contains numeric and narrative land discharge specifications and reclamation specifications (Section IV), narrative and numeric groundwater limitations (Section V), Special Studies (Section VI.C), and monitoring and reporting requirements (Attachment E) to protect the quality of the underlying groundwater and the applicable uses. Additionally, this Order does not allow an increased volume of waste or an increase in wastewater discharge to land compared to the discharges allowed in Order No.R5-2004-0028.

- **Permit Section 7. Compliance Schedules a. Compliance Schedules for Final Groundwater Limitations and Exemption from Title 27 for Reuse on Agricultural Fields.** This Order requires compliance with the final groundwater limitations by **1 October 2014**. Compliance with the groundwater limitations will result in the reuse of wastewater on the agricultural fields meeting the preconditions for an exemption from Title 27. Therefore, this compliance schedule temporarily exempts the Discharger from compliance with Title 27 to allow time for the Discharger to meet all preconditions for an exemption from Title 27. The Discharger shall comply with the following time schedule to ensure compliance with the final groundwater limitations and to demonstrate the reuse of wastewater on the agricultural fields is in compliance with the Basin Plan…

- As previously stated, discharges to land are exempt from the requirements of Title 27, CCR, subject to preconditions. The principal precondition is that the discharge must be in compliance with the Basin Plan. The Discharger's groundwater monitoring data indicate that the discharge, at times, has caused the groundwater water quality to exceed water quality objectives, or background groundwater levels, as discussed in detail in section V.B of this Fact Sheet. Therefore to comply with the Basin Plan, this Order includes groundwater limits to protect applicable beneficial uses. However, immediate compliance with these new groundwater receiving water limitations is not possible or practicable, and therefore, this Order also includes a compliance schedule for achieving compliance. Consequently, at this time the reuse of wastewater on the agricultural fields does not meet the preconditions for an exemption from Title 27 under section 20090(b), because the Discharger is not meeting the groundwater limitations. The compliance schedule for the Discharger to come into compliance with the groundwater limitations also includes a compliance schedule for meeting the preconditions for the exemption from Title 27, because compliance with the groundwater limits would result in the reuse of wastewater on the agricultural fields meeting the preconditions for an exemption from Title 27.

- In 2007, the Facility was also modified to fully separate the food-processing waste received form Eckert Cold Storage to discharge into the Facility's pond, which is tetra lined, and then applied to agricultural land as needed. As approved by the Regional Water Board and USEPA, Eckert was removed from the Discharger's Pretreatment Program, and instead, is regulated through a local ordinance wastewater discharge permit. The local ordinance in part requires Eckert to submit reports, sample their discharge, and develop any plans (e.g. pollution prevention) that are deemed necessary. Eckert Cold Storage is a seasonal discharger that processes frozen vegetables, cabbage and a variety

of peppers. The food processing wastewater is pretreated by screening, DAF system, and pH neutralization before discharging to the Facility.

The Discharger has not submitted recommended implementation of additional BPTCs to minimize further degradation of the underlying groundwater, or a report demonstrating that the Discharger's land applications are consistent with the requirements in Resolution No. 68-16. Therefore, this Order contains groundwater limitations, land discharge specifications, and reclamation specifications for the protection of the beneficial uses of groundwater. Further, the Monitoring and Reporting Program section of this Order requires the City to implement and submit a Nutrient Management Plan.

- A separate industrial line accepts food processing wastewater seasonally from Eckert Cold Storage from about May through November. Eckert Cold Storage processes frozen vegetables (e.g. cabbage and a variety of peppers), and discharges primarily wastewaters from the cutting and washing of these vegetables. However, at times, the food processing wastewater is mixed with wastewaters from clean-up of the processing equipment, freezer defrost waters, and cooling towers. The food processing wastewater is stored and aerated in a lined pond at the Facility, and then applied to agricultural fields when needed." (Permit Findings)

The proposed Permit does not comply with CCR Title 27 and the wastewater discharge does not qualify for an exemption for CCR Title 27 based on the following facts:

- The proposed Permit acknowledges that the wastewater discharge has degraded and polluted groundwater quality for total dissolved solids, nitrate, pH and "several of the trace metals" which are not identified and at a minimum threatens groundwater quality for ammonia.

- Total dissolved solids were found to be present in the groundwater at an average concentration range from 443 mg/L to 893 mg/l. The drinking water MCL for TDS begins at 500 mg/l. The agricultural water quality goal is 450 mg/l. Degradation above a water quality standard is defined as pollution by the California Water Code (CWC) Section 13050. The proposed Permit only reports the "average" groundwater quality concentrations; the peak concentration will be higher than the average. The Discharger has polluted groundwater quality with TDS above the MCL and the agricultural water quality goal degrading the drinking water and irrigated agriculture beneficial uses. The Discharge is therefore not consistent with applicable water quality objectives and the applicable water quality control plan (Basin Plan).

- Nitrate was found to be present in the groundwater at an average concentration range from 0.04 mg/L to 24.9 mg/L as nitrogen. Groundwater monitoring data show nitrate concentrations above the primary MCL of 10 mg/L in monitoring wells MW-3 and MW-5. The Chemical Constituents objective prohibits concentrations of chemical constituents in excess of California MCLs in groundwater that is designated as municipal or domestic supply. The California primary MCL for nitrate is equivalent to 10 mg/L as nitrogen, and groundwater beneath the facility is designated as municipal or domestic supply. The

proposed Permit only reports the "average" groundwater quality concentrations; the peak concentration will be higher than the average. The Discharger has polluted groundwater quality with nitrate. The Discharger has polluted groundwater quality with nitrate above the MCL degrading the drinking water beneficial use. The Discharge is therefore not consistent with applicable water quality objectives and the applicable water quality control plan (Basin Plan).

- pH ranged from 6.7 to 7.4 standard units in the domestic wastewater and from 4.45 to 11.53 in the food processing wastewater, has the ability to degrade groundwater quality at this site because there is little potential for buffering in the shallow permeable vadose zone. According to Ayers and Westcot, pH less than 6.5 or greater than 8.4 can cause yield or vegetative growth reductions of sensitive crops if present in irrigation water, thereby impairing agricultural use of the water resource. The Discharger has polluted groundwater quality with pH threatening the irrigated agriculture beneficial use. The Discharge is therefore not consistent with applicable water quality control plan (Basin Plan).

- The proposed Permit states that: "The Discharger's groundwater characterization study (*Background Hydrogeologic Characterization Study, 26 September 2006,* Condor Earth Technologies, Inc.) also summarized all groundwater data collected to date and concluded that "groundwater quality under beneath and down gradient of the facility appear to be of poorer quality than upgradient groundwater for total dissolved solids, nitrate, and several of the trace metals." The proposed permit fails to identify the specific trace metals being discussed; however the Discharger has degraded groundwater quality for trace metals. Based on the incomplete information in the proposed Permit regarding trace metal concentrations it is not possible to determine if the discharge has exceeded water quality standards and objectives or to what degree groundwater has been degraded. However, the degradation of groundwater quality is contrary to the Antidegradation Policy (Resolution 68-16) a part of the Basin Plan and the discharge is therefore not consistent with applicable water quality control plan

- Ammonia has the potential to degrade groundwater quality because there is little ability for ammonia attenuation in the shallow permeable vadose zone at this site. According to Amoore and Hautala 1, who evaluated odor of ammonia in water, the odor threshold for ammonia in water is 1.5 mg/L (as NH4). These authors studied the concentration of chemicals in air that caused adverse odors and then calculated the concentration in water that would be equivalent to that amount in air. Therefore, it is appropriate to use the data contained therein to apply the narrative Tastes and Odors water quality objective. The Discharge is therefore not consistent with applicable water quality objectives and the applicable water quality control plan (Basin Plan).

- Despite that undisinfected secondary effluent is mixed with food processing waste and applied to approximately 190 acres of the Discharger-owned agricultural fields and 70 acres of Dutra Farms Inc. owned agricultural fields the proposed Permit does not discuss whether groundwater was sampled for coliform organisms. The Basin Plan contains a

water quality objective for coliform organisms.

- The proposed permit acknowledges that: "As previously stated, discharges to land are exempt from the requirements of Title 27, CCR, subject to preconditions. The principal precondition is that the discharge must be in compliance with the Basin Plan. The Discharger's groundwater monitoring data indicate that the discharge, at times, has caused the groundwater water quality to exceed water quality objectives, or background groundwater levels, as discussed in detail in section V.B of this Fact Sheet. Therefore to comply with the Basin Plan, this Order includes groundwater limits to protect applicable beneficial uses. However, immediate compliance with these new groundwater receiving water limitations is not possible or practicable, and therefore, this Order also includes a compliance schedule for achieving compliance. Consequently, at this time the reuse of wastewater on the agricultural fields does not meet the preconditions for an exemption from Title 27 under section 20090(b), because the Discharger is not meeting the groundwater limitations." (emphasis added)

- A separate industrial line accepts food processing wastewater seasonally from Eckert Cold Storage from about May through November. Eckert Cold Storage processes frozen vegetables (e.g. cabbage and a variety of peppers), and discharges primarily wastewaters from the cutting and washing of these vegetables. However, at times, the food processing wastewater is mixed with wastewaters from clean-up of the processing equipment, freezer defrost waters, and cooling towers. The food processing wastewater is stored and aerated in a lined pond at the Facility, and then applied to agricultural fields when needed. As approved by the Regional Water Board and USEPA, Eckert was removed from the Discharger's Pretreatment Program, and instead, is regulated through a local ordinance wastewater discharge permit. The local ordinance in part requires Eckert to submit reports, sample their discharge, and develop any plans (e.g. pollution prevention) that are deemed necessary. Eckert Cold Storage is a seasonal discharger that processes frozen vegetables, cabbage and a variety of peppers. The food processing wastewater is pretreated by screening, DAF system, and pH neutralization before discharging to the Facility. The Discharger has not submitted recommended implementation of additional BPTCs to minimize further degradation of the underlying groundwater, or a report demonstrating that the Discharger's land applications are consistent with the requirements in Resolution No. 68-16.

  In August 2005, the Discharger obtained higher-quality surface water from South County Water Supply Program to blend with its existing groundwater drinking water supply to improve its drinking water supply source (e.g. lower salinity). In May 2006, biological nitrification-denitrification was added to the secondary treatment process. In September 2007, the City also added a secondary effluent equalization pond, a filter-feed pump station, coagulation and flocculation facilities, tertiary filters, a chemical storage and handling facility, an ultraviolet light pathogen deactivation system (UV Disinfection), an effluent pumping station, a recycled water pumping station, a groundwater well for plant process water, and a construction truck recycled water filling station. In 2007, the Facility was also modified to fully separate the food-processing waste received from Eckert Cold Storage to apply directly to agricultural fields. The Discharger has implemented several

management practices (e.g. nitrification-denitrification facilities, biosolids now sent off-site for disposal, etc.).

All of the cited improvements to the wastewater treatment facility apply only to the domestic wastewater treatment system. Industrial wastes are discharged through a separate sewer and discharged directly to land. The industrial wastestream receives little treatment, filtering of solids and pH adjustment. The pH adjustment process likely adds additional salts (EC, TDS). The proposed Permit contains no characterization of the industrial discharge, which may be largely responsible for a significant portion of the observed groundwater degradation and pollution. The industrial discharge has been removed from the Industrial Pretreatment Program, which is logical since even the collection system is different; however the proposed Permit fails to adequately regulate this discharge.

The proposed Permit correctly states that: "…at this time the reuse of wastewater on the agricultural fields does not meet the preconditions for an exemption from Title 27 under section 20090(b), because the Discharger is not meeting the groundwater limitations." The proposed Permit is incorrect in the establishment of a compliance time schedule to comply with groundwater limitations rather than require full and immediate compliance with CCR Title 27. The Regional Board fails to recognize that if an exception to CCR Title 27 is not applicable then the regulation must be applied. The proposed Permit incorrectly requires that: "This Order requires compliance with the final groundwater limitations by **1 October 2014**. Compliance with the groundwater limitations will result in the reuse of wastewater on the agricultural fields meeting the preconditions for an exemption from Title 27. Therefore, this compliance schedule temporarily exempts the Discharger from compliance with Title 27 to allow time for the Discharger to meet all preconditions for an exemption from Title 27." The Regional Board does not have the authority to "temporarily exempt" a discharge from a regulatory requirement. The proposed Permit is virtually silent with regard to assessment and regulating the disposal of industrial wastes, which likely have significantly contributed to groundwater degradation and pollution. The Regional Board's focus has been completely focused on the domestic wastewater treatment plant, which now produces a tertiary quality of effluent. Each of the Regional Board permits contains a statement that: "It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order (40 CFR 122.41(c). While it may not be reasonable to stop domestic wastewater treatment, the industrial discharge could be stopped until compliance with CCR Title 27 can be achieved.

3. The proposed Permit includes *Ultraviolet (UV) Disinfection System Operating Requirements* for the newly installed system but fails to recognize that UV disinfection could result in the discharge of additional pollutants; the waste characterization could be considered incomplete.

The Discharger has replaced their chlorine disinfection system with an ultraviolet light disinfection system. The guiding principal in replacing chlorine with UV is to eliminate trihalomethane, especially those listed in the CTR as compliance can be challenging. In addition to being a disinfectant; chlorine also acts to oxidize chemicals remaining in the wastewater

effluent. Little study has been conducted to date regarding the additional pollutants discharged when chlorine is eliminated as a disinfectant and an oxidizing agent.

The proposed Permit states that: **"**Because the Facility has undergone major upgrades (See section II of this Fact Sheet), the reasonable potential analysis (RPA), as described in section IV.C.3 of this Fact Sheet, for inorganics and non-conventional pollutants was based on effluent data from September 2007 through August 2008, which was submitted in the Discharger's self-monitoring reports. The RPA for the remaining effluent monitoring results and for the ambient background monitoring results were based on data from 27 April 2004 through 30 December 2008 because only a single sampling per constituent was obtained since Facility upgrades, which is insufficient data to perform an RPA."

EPA established the CTR in May of 2000 (Federal Register / Vol. 65, No. 97 / Thursday, May 18, 2000 / Rules and Regulations, Environmental Protection Agency 40 CFR Part 131, Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California) which promulgates: numeric aquatic life criteria for 23 priority toxic pollutants; numeric human health criteria for 57 priority toxic pollutants; and a compliance schedule provision which authorizes the State to issue schedules of compliance for new or revised National Pollutant Discharge Elimination System permit limits based on the federal criteria when certain conditions are met. Section *3, Implementation,* requires that once the applicable designated uses and water quality criteria for a water body are determined, under the National Pollutant Discharge Elimination System (NPDES) program discharges to the water body must be characterized and the permitting authority must determine the need for permit limits. If a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criteria, the permitting authority must develop permit limits as necessary to meet water quality standards. These permit limits are water quality-based effluent limitations or WQBELs. The terms ''cause,'' ''reasonable potential to cause,'' and ''contribute to'' are the terms in the NPDES regulations for conditions under which water quality based permit limits are required (See 40 CFR 122.44(d)(1)).

The proposed Permit should require an immediate and complete characterization of the wastewater effluent to determine compliance with water quality standards and objectives.

4. The proposed Permit moves Effluent Limitations for turbidity to a Special Provisions Section in an attempt to avoid mandatory minimum penalties as required by CWC 13385.

Turbidity limitations are maintained in the proposed Permit but have been moved to "Special Provisions", they are no longer Effluent Limitations. The only rational that can explain moving the turbidity from Effluent Limitations to Provisions is to protect Dischargers from mandatory minimum penalties as prescribed by the California Water Code, Section 13385. It is doubtful that it was intent of the legislature in adopting the mandatory penalty provisions to have the Regional Boards delete Effluent Limitations from permits to avoid penalties. However CWC 13385 states that (c) For the purposes of this section, paragraph (2) of subdivision (f) of Section 13385, and subdivisions (h), (i), and (j) of Section 13385 only, "effluent limitation" means a numeric restriction or a numerically expressed narrative restriction, on the quantity, discharge

rate, concentration, or toxicity units of a pollutant or pollutants that may be discharged from an authorized location. An effluent limitation may be final or interim, and may be expressed as a prohibition. An effluent limitation, for those purposes, does not include a receiving water limitation, a compliance schedule, or a best management practice. This citation indicates that regardless of the location, the turbidity limitation in the proposed Permit is still covered under the requirements for mandatory minimum penalties.

5. The proposed Permit contains language defining average dry weather flow that is ripe for misinterpretation.

The proposed permit states that: "E. Average Dry Weather Flow Effluent Limitations (Section IV.A.1.f. and 2.f.). The average dry weather discharge flow represents the daily average flow when groundwater is at or near normal and runoff is not occurring. Compliance with the average dry weather flow effluent limitations will be determined annually based on the average daily flow over three consecutive dry weather months (e.g., July, August, and September)."

Groundwater elevations are "normally" high during wet weather. "Normal" does not necessarily indicate low groundwater elevations. In areas surrounded by irrigated agriculture, especially rice fields, a common occurrence in the Central Valley, groundwater elevations can be elevated regardless of precipitation. Some wastewater dischargers experience higher flow rates during the summer months; this is true of UC Davis due to cooling tower discharges and Dischargers who receive food processing wastewater flows. Runoff is not defined and could easily indicate excessive irrigation. The Regional Board's language is at best ambiguous and should be modified.

6. The proposed Permit establishes Effluent Limitations for metals based on the hardness of the effluent as opposed to the ambient upstream receiving water hardness as required by Federal Regulations, the California Toxics Rule (CTR, 40 CFR 131.38(c)(4)).

The proposed Permit Fact Sheet, Hardness, pages F- 19 through 27, contains the following statements:

> "The effluent hardness ranged from 82 mg/L to 180 mg/L (as CaCO3), based on 32 samples from April 2004 through March 2008. The upstream receiving water hardness varied from 36 mg/L to 240 mg/L (as CaCO3), based on 36 samples from March 2002 through November 2006. Using a hardness of 82 mg/L (as CaCO3) to calculate the ECA for all Concave Down Metals will result in water quality-based effluent limitations that are protective under all potential effluent/receiving water mixing scenarios and under all known hardness conditions"
>
> "Therefore, in Table F-8, the ECA has been iteratively determined assuming the minimum observed upstream receiving water hardness, a maximum upstream silver concentration 0.5 _g/L (i.e., _ of the maximum method detection limit), and the effluent at the minimum observed hardness. As shown in Table F-8, the chronic ECA for silver is 2.7 _g/L. Using Equation 3 to calculate the ECA for all Concave Up Metals will result in

> water quality-based effluent limitations that are protective under all potential effluent/receiving water mixing scenarios and under all known hardness conditions, as previously demonstrated in Table F-6 for silver. In this example, the effluent is in compliance with the CTR criteria and any mixture of the effluent and receiving water is in compliance with the CTR criteria."
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> "Use of a lower ECA (e.g., calculated based solely on the lowest upstream receiving water hardness) is also protective, but would lead to unreasonably stringent effluent limits considering the known conditions. Therefore, Equation 3 has been used to calculate the ECA for all Concave Up Metals in this Order."

It cannot be disputed that the use of 82 mg/l as the hardness is that of the wastewater effluent, not the actual ambient surface water hardness.

Federal Regulation 40 CFR 131.38(c)(4) states that: "For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, for waters with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations." (Emphasis added). The proposed Permit states that the effluent hardness and the downstream hardness were used to calculate Effluent Limitations for metals. The definition of *ambient* is "in the surrounding area", "encompassing on all sides". It has been the Region 5, Sacramento, NPDES Section, in referring to Basin Plan objectives for temperature, to define *ambient* as meaning upstream. It is reasonable to assume, after considering the definition of ambient, that EPA is referring to the hardness of the receiving stream before it is potentially impacted by an effluent discharge. It is also reasonable to make this assumption based on past interpretations and since EPA, in permit writers' guidance and other reference documents, generally assumes receiving streams have dilution, which would ultimately "encompass" the discharge. Ambient conditions are in-stream conditions unimpacted by the discharge.

The Federal Register, Volume 65, No. 97/Thursday, May 18th 2000 (31692), adopting the California Toxics Rule in confirming that the ambient hardness is the upstream hardness, absent the wastewater discharge, states that: "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. If it appears that an effluent causes hardness to be inconsistent with alkalinity and/or pH the intended level of protection will usually be maintained or exceeded if either (1) data are available to demonstrate that alkalinity and/or pH do not affect the toxicity of the metal, or (2) the hardness used in the hardness equation is the hardness of upstream water that does not include the effluent. The level of protection intended by the 1985 guidelines can also be provided by using the WER procedure."

On March 24, 2000 the US Fish and Wildlife Service (Service) and the National Marine Fisheries Service (NMFS) issued a biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the

Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act). The biological opinion was issued to the U.S. Environmental Protection Agency, Region 9, with regard to the "Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" (CTR)". The document represented the Services' final biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act).

On Page 13 (C) and repeated on pages 216 and 232 of the biological opinion it is required that:

> "By June of 2003, EPA, in cooperation with the Services, will develop a revised criteria calculation model based on best available science for deriving aquatic life criteria on the basis of hardness (calcium and magnesium), pH, alkalinity, and dissolved organic carbon (DOC) for metals."

The biological opinion contains the following discussion, beginning on page 205, regarding the use of hardness in developing limitations for toxic metals:

> "The CTR should more clearly identify what is actually to be measured in a site water to determine a site-specific hardness value. Is the measure of hardness referred to in the CTR equations a measure of the water hardness due to calcium and magnesium ions only? If hardness computations were specified to be derived from data obtained in site water calcium and magnesium determinations alone, confusion could be avoided and more accurate results obtained (APHA 1985). Site hardness values would thus not include contributions from other multivalent cations (e.g., iron, aluminum, manganese), would not rise above calcium + magnesium hardness values, or result in greater-than-intended site criteria when used in formulas. In this Biological opinion, what the Services refer to as hardness is the water hardness due to calcium + magnesium ions only.
>
> The CTR should clearly state that to obtain a site hardness value, samples should be collected upstream of the effluent source(s). Clearly stating this requirement in the CTR would avoid the computation of greater-than-intended site criteria in cases where samples were collected downstream of effluents that raise ambient hardness, but not other important water qualities that affect metal toxicity (e.g., pH, alkalinity, dissolved organic carbon, calcium, sodium, chloride, etc.). Clearly, it is inappropriate to use downstream site water quality variables for input into criteria formulas because they may be greatly altered by the effluent under regulation. Alterations in receiving water chemistry by a discharger (e.g., abrupt elevation of hardness, changes in pH, exhaustion of alkalinity, abrupt increases in organic matter etc.) should not result, through application of hardness in criteria formulas, in increased allowable discharges of toxic metals. If the use of downstream site water quality variables were allowed, discharges that alter the existing, naturally-occurring water composition would be encouraged rather than discouraged. Discharges should not change water chemistry even if the alterations do not result in toxicity, because the aquatic communities present in a water body may prefer the unaltered environment over the discharge-affected environment. Biological criteria may

be necessary to detect adverse ecological effects downstream of discharges, whether or not toxicity is expressed.

The CTR proposes criteria formulas that use site water hardness as the only input variable. In contrast, over twenty years ago Howarth and Sprague (1978) cautioned against a broad use of water hardness as a "shorthand" for water qualities that affect copper toxicity. In that study, they observed a clear effect of pH in addition to hardness. Since that time, several studies of the toxicity of metals in test waters of various compositions have been performed and the results do not confer a singular role to hardness in ameliorating metals toxicity. In recognition of this fact, most current studies carefully vary test water characteristics like pH, calcium, alkalinity, dissolved organic carbon, chloride, sodium, suspended solid s, and others while observing the responses of test organisms. It is likely that understanding metal toxicity in waters of various chemical makeups is not possible without the use of a geochemical model that is more elaborate than a regression formula. It may also be that simple toxicity tests (using mortality, growth, or reproductive endpoints) are not capable of discriminating the role of hardness or other water chemistry characteristics in modulating metals toxicity (Erickson *et al*. 1996). Gill surface interaction models have provided a useful framework for the study of acute metals toxicity in fish (Pagenkopf 1983; Playle *et al*. 1992; Playle *et al*. 1993a; Playle *et al*. 1993b; Janes and Playle 1995; Playle 1998), as have studies that observe physiological (e.g. ion fluxes) or biochemical (e.g. enzyme inhibition) responses (Lauren and McDonald 1986; Lauren and McDonald 1987a; Lauren and McDonald 1987b; Reid and McDonald 1988; Verbost *et al*. 1989; Bury *et al*. 1999a; Bury *et al*. 1999b). Even the earliest gill models accounted for the effects of pH on metal speciation and the effects of alkalinity on inorganic complexation, in addition to the competitive effects due to hardness ions (Pagenkopf 1983). Current gill models make use of sophisticated, computer-based, geochemical programs to more accurately account for modulating effects in waters of different chemical makeup (Playle 1998). These programs have aided in the interpretation of physiological or biochemical responses in fish and i n investigations that combine their measurement with gill metal burdens and traditional toxicity endpoints.

The Services recognize and acknowledge that hardness of water and the hardness acclimation status of a fish will modify toxicity and toxic response. However the use of hardness alone as a universal surrogate for all water quality parameters that may modify toxicity, while perhaps convenient, will clearly leave gaps in protection when hardness does not correlate with other water quality parameters such as DOC, pH, Cl- or alkalinity and will not provide the combination of comprehensive protection and site specificity that a multivariate water quality model could provide. In our review of the best available scientific literature the Services have found no conclusive evidence that water hardness, by itself, in either laboratory or natural water, is a consistent, accurate predictor of the aquatic toxicity of all metals in all conditions.

Hardness as a predictor of copper toxicity: Lauren and McDonald (1986) varied pH, alkalinity, and hardness independently at a constant sodium ion concentration, while measuring net sodium loss and mortality in rainbow trout exposed to copper. Sodium loss

was an endpoint investigated because mechanisms of short-term copper toxicity in fish are related to disruption of gill ionoregulatory function. Their results indicated that alkalinity was an important factor reducing copper toxicity, most notably in natural waters of low calcium hardness and alkalinity. Meador (1991) found that both pH and dissolved organic carbon were important in controlling copper toxicity to *Daphnia magna*. Welsh *et al*. (1993) demonstrated the importance of dissolved organic carbon in affecting the toxicity of copper to fathead minnows and suggested that water quality criteria be reviewed to consider the toxicity of copper in waters of low alkalinity, moderately acidic pH, and low dissolved organic carbon concentrations. Applications of gill models to copper binding consider complexation by dissolved organic carbon, speciation and competitive effects of pH, and competition by calcium ions, not merely water hardness (Playle *et al*. 1992; Playle *et al*. 1993a; Playle *et al*. 1993b). Erickson *et al*. (1996) varied several test water qualities independently and found that pH, hardness, sodium, dissolved organic matter, and suspended solids have important roles in determining copper toxicity. They also suggested that it might be difficult to sort out the effects of hardness based on simple toxicity experiments. It is clear that these studies question the use of site calcium + magnesium hardness only as input to a formula to derive a criterion for copper because pH, alkalinity, and dissolved organic carbon concentrations are key water quality variables that also modulate toxicity. In waters of moderately acidic pH, low alkalinity, and low dissolved organic carbon, the use of hardness regressions may be most inaccurate. Also, it is not clear that the dissolved organic carbon in most or all waters render metals unavailable. This is because dissolved organic carbon from different sources may vary in both binding capacity and stability (Playle 1998).

Hardness as a predictor of silver toxicity: While there is strong evidence that ionic silver is the form responsible for causing acute toxicity in freshwater fish, recent science (Wood et al, 1999; Bruy eta al, 1999; Karen et al, 1999; Galvez and Wood, 1997; Hogstrand and Wood, 1998) challenges the EPA concept of hardness as having a large ameliorating effect on aquatic toxicity of silver. These studies indicate that chloride and dissolved organic carbon concentrations must be accounted for in the criterion formula for this metal. Bury *et al*. (1999) exposed rainbow trout to silver nitrate and measured physiological (Na+ influx) and biochemical (gill Na+/K+-ATPase activity) endpoints, as well as silver accumulations in gills. They found that chloride and dissolved organic carbon concentrations, but not calcium hardness, ameliorated the inhibition of Na+ influx and gill Na+/K+-ATPase activity. Dissolved organic carbon greatly reduced gill accumulations of silver through complexation. Chloride ion did not reduce gill accumulations of silver because it bound with free silver (Ag+) and accumulated in gills as AgCl, but reduced toxicity because the AgCl did not enter chloride cells and disrupt ionoregulation.

Calcium, the hardness ion thought to modify metals toxicity to the greatest degree is, by itself, not that protective in the case of silver. Karen *et al*. 1999 found DOC more important than hardness for predicting the toxicity of ionic silver in natural waters to rainbow trout, fathead minnows and *Daphnia magna*. These authors suggested incorporating an organic carbon coefficient into the silver criterion equation to enhance

> the site specificity of criterion. Wood et al (1999) noted chloride ion and DOC were influential in ameliorating silver toxicity and that in ammonia rich waters silver might be more than additively toxic with ammonia to fish.
>
> Hardness as a predictor of cadmium toxicity: Our review of acute cadmium toxicity in fish indicates that calcium hardness does exhibit ameliorating effects (Reid and McDonald 1988; Verbost *et al*. 1989; Playle and Dixon 1993). However, most studies that manipulated hardness ions varied only calcium and so there is little evidence that magnesium ions ameliorate cadmium toxicity. Investigations of the differences between these two hardness constituents (Carroll *et al*.1979; Davies *et al*. 1993) revealed that magnesium ions provide little or no protection against acute cadmium toxicity in fish. Hunn (1985) suggested that calcium binds to biological molecules in ways that magnesium does not, due to differences in the coordination geometry of the ions. Mechanistic studies of cadmium toxicity in fish reveal that cadmium inhibits enzyme-mediated calcium uptake in the gills (Verbost *et al*. 1989). Dissolved organic carbon, if present in sufficient concentrations and binding strengths, may also modulate cadmium toxicity. In natural waters hardness, pH, alkalinity, salinity, and temperature may also interact to affect cadmium toxicity but these factors may not always correlate to hardness measures at a given waterbed." (Emphasis added by underline)

The result of using a higher effluent or downstream hardness value is that metals are toxic at higher concentrations, discharges have less reasonable potential to exceed water quality standards and the resulting Permits have fewer Effluent Limitations or if Effluent Limitations are established they are less stringent.

The most typical wastewater discharge situation is where the receiving water hardness is lower than the effluent hardness. Metals are more toxic in lower hardness water. Therefore in this case it must follow those metals would be more toxic in the receiving water than in the effluent. For example; if the receiving water hardness is 25 mg/l and the effluent hardness is 50 mg/l a corresponding chronic discharge limitation for copper based on the different hardness's would be 2.9 ug/l and 5.2 ug/l, respectively. Obviously, the limitation based on the ambient receiving water hardness is more restrictive. For this case however the Regional Board's argues that the higher effluent hardness or the downstream hardness is protective of all beneficial uses. Since the limitation based on the upstream ambient hardness is more restrictive; the Regional Board's argument can only be made if in-stream mixing is considered. Mixing zones may be granted in accordance with extensive requirements contained in the SIP and the Basin Plan to establish Effluent Limitations. Mixing zones cannot be considered in conducting a reasonable potential analysis to determine whether a constituent will exceed a water quality standard or objective. The Regional Board's approach in using the effluent or downstream hardness to conduct a reasonable potential analysis and consequently establish effluent limitations can only be utilized if mixing is considered; otherwise the ambient (upstream) hardness results in significantly more restrictive limitations. A mixing zone allowance has not been discussed with regard to this issue and therefore does not comply with the SIP. Verification of the Regional Boards use of "mixing" in implementing their procedure can be found in text of Finding No. 4. The issue is that the Regional Board fails to comply with the regulatory requirement to use the ambient instream hardness for limiting hardness dependant metals under the CTR. Use of the effluent or

the effluent receiving water mix simply does not meet the definition of the actual ambient hardness of the receiving stream.

7. The proposed permit allows for use of a "translator" for copper that are not sufficiently protective of threatened and endangered aquatic species.

As stated in the proposed Permit, page F-40: "The Discharger conducted a copper translator study, and submitted the final results and recommendations to the Regional Water Board on 31 January 2007, "City of Manteca Copper Monitoring Study Results." The calculations of the acute and chronic translators were based on EPA and SIP guidance, and on the results of simulated 4:1 receiving water effluent samples because Order No. R5-2004-0028 granted a 4:1 dilution credit for chronic aquatic criteria constituents. However, because dilution credits are not granted for chronic aquatic criteria in this Order (see previous section IV.C.2.e of this Fact Sheet), the acute and chronic translators from the study were not used to translate dissolved copper concentrations to total concentrations. The Discharger recalculated the acute and chronic translators based on EPA and SIP guidance, and on the effluent sample results obtained during the translator study. Regional Water Board concurs with the results of the site-specific translator study, and therefore, the acute and chronic translators of 0.78 and 0.70 were used to convert the copper dissolved criteria to total recoverable criteria."

On March 24, 2000 the US Fish and Wildlife Service (Service) and the National Marine Fisheries Service (NMFS) issued a biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act). The biological opinion was issued to the U.S. Environmental Protection Agency, Region 9, with regard to the "Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" (CTR)". The document represented the Services' final biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act). The biological opinion contained the following discussion with regard to Conversion Factors and Translators.

"Conversion Factors and Translators

EPA derived ambient metals criteria from aquatic toxicity tests that observed the dose-response relationships of test organisms under controlled (laboratory) conditions. In most of these studies, organism responses were plotted against nominal test concentrations of metals or concentrations determined on unfiltered samples. Thus, until recently metals criteria have been expressed in terms of total metal concentrations. Current EPA metals policy (USEPA 1993a) and the CTR in particular propose that criteria be expressed on a dissolved basis because particulate metals contribute less toxicity than dissolved forms. EPA formulas for computing criteria thus are adjusted via a conversion factor (CF), so that criteria based on total metal concentrations can be "converted" to a dissolved basis. Metals for which a conversion factor has been applied include arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc.

The CF is a value that is used to estimate the ratio of dissolved metals to total recoverable metals to adjust the former criteria based on total metal to yield a dissolved metal criterion. A CF based on the premise that the dissolved fraction of the metals in water is the most bioavailable and therefore the most toxic (USEPA 1993a, 1997c). The presumption is that the dose/response relationships found in toxicity tests would be more precise if "dissolved" metal concentrations were determined in test solution samples that have been filtered to remove the larger-sized, particulate metal fraction. The term "total" metal refers to metal concentrations determined in unfiltered samples that have been acidified (pH < 2) before analysis. The term "dissolved" metal refers to metal concentrations determined in samples that have been filtered (generally a 0.45-micron pore size) prior to acidification and analysis. Although it is clear that concentrations determined in a procedurally-defined dissolved sample are not accurate measures of dissolved metals, it may be premature to recommend immediate changes to the current procedure (Chapman 1998). Particulate metals can be single atoms or metal complexes adsorbed to or incorporated into silt, clay, algae, detritus, plankton, etc., which can be removed from the test water by filtration through a 0.45 micron filter. A CF value is always less than 1 (except for As which is currently 1.0) and is multiplied by a total criterion to yield a (lower) dissolved criterion.

For example, CF values for Cd, Cu, Pb, and Zn, are 0.944, 0.960, 0.791, and 0.978 respectively (USEPA 1997c). The CF values approach 100 percent for several metals because they are ratios determined in laboratory toxicity-test solutions, not in natural waters where relative contributions of waterborne particulate metals are much greater. The California Department of Fish and Game (CDFG 1997) has commented that particulate fractions in natural waters in California are often in the range of 80 percent, which would equate to a dissolved-to-total ratio of 0.2. To convert metals criteria, EPA reviewed test data that reported both total and dissolved concentrations in their test waters and also conducted simulations of earlier experiments to determine the dissolved-to-total ratios (USEPA 1992, 1995a, 1997c). In this way, the historical toxicity database could be preserved and a large number of new toxicity tests would not have to be performed. Overall, the CFs proposed in the CTR are based upon roughly 10% of the historical database of toxicity tests. CF values for As and Ni were based on only 1 study each, comprising 11 records. CF values for Cr were based on only 2 studies, while the estimated CF for Pb was based on 3 studies, comprised of only 3 records. Although additional confirmatory studies were performed to develop the CFs, the database available appears to be limited and calls into question the defensibility of the CFs determined for these metals.

Ultimately the scientifically most defensible derivation of dissolved metals criteria should be based on reviews of new laboratory investigations because:

1. The several water quality variables that modulate metal toxicity may not have been properly controlled, measured, reported, or manipulated over ranges that are environmentally realistic and necessary to consider if site-specific criteria are to be proposed (see section on hardness);

2. It is likely that most toxicity tests measured organism responses in terms of traditional endpoints such as mortality, growth, reproductive output. These may not be sufficient for determining the toxic effects of metals in test waters manipulated to reflect environmental (site) conditions (see section on hardness);

3. The test waters contained very low contributions from particulate metals to the total metal concentrations. These proportions are not environmentally realistic; and

4. The present EPA criteria for metals lack meaningful input and modification from metals toxicity research done in the last decade.

Points 1 and 2 above are discussed in this final biological opinion in the hardness section dealing with the use of water hardness as a general water quality "surrogate". Point 3 is illustrated by the fact that the CF's proposed in the CTR for several metals are near a value of 1.0. This indicates that the toxicity tests reviewed to derive dissolved-based criteria exposed test organisms in waters that contained very low concentrations of particulate metals. For example, the CF values for Cd, Cu, Pb, and Zn, are 0.944, 0.960, 0.791, and 0.978 respectively (USEPA 1997c), meaning that particulate metal percentages were (on average) 5.6%, 4.0%, 20.9%, and 2.2%. These percentages are much lower than found in many natural waters. The California Department of Fish and Game, in their comments to the EPA on the proposed CTR, has stated that particulate fractions in natural waters in California are often in the range of 80 percent (CDFG 1997), which would equate to a dissolved-to-total ratio of 0.2. It is clear that the historical toxicity database does not include studies of the toxic contributions of particulate metals under environmentally realistic conditions. Improved assessments are necessary to develop adequately protective, site-specific criteria.

The EPA Office of Water Policy and Technical Guidance has noted that particulate metals contribute some toxicity and that there is considerable debate in the scientific community on this point (USEPA 1993a). While the Services agree that dissolved metal forms are generally more toxic, this is not equivalent to saying that particulate metals are non-toxic, do not contribute to organism exposure, or do not require criteria guidance by the EPA. Few studies have carefully manipulated particulate concentrations along with other water constituents, to determine their role(s) in modulating metals toxicity. Erickson *et al*. (1996) performed such a study while measuring growth and survival endpoints in fish and suggested that copper adsorbed to particulates cannot be considered to be strictly non-toxic. Playle (1997) cautions that it is premature to dismiss particulate-associated metals as biologically unavailable and recommends the expansion of fish gill-metal interaction models to include these forms. The Service is particularly concerned that investigations have not been performed with test waters that contain both high particulate metal concentrations and dissolved concentrations near the CTR-proposed criteria concentrations.

Despite a paucity of information about the aquatic toxicity of particulate metals, the CTR proposes that compliance would be based on removing (filtering) these contaminants from a sample prior to analysis. It would be prudent to first conduct short-term and longer-term studies, as well as tests that expose organisms other than fish. Particulates may act as a sink for metals, but they may also act as a source. Through chemical, physical, and biological activity these metals can become bioavailable (Moore and Ramamoorthy 1984). Particulate and dissolved metals end up in sediments but are not rendered entirely nontoxic nor completely immobile, thus they still may contribute to the toxicity of the metal in natural waters.

Particulate metals have been removed from the regulatory " equation" through at least two methods: the use of a CF to determine the dissolved metal criteria, and the use of a translator to convert back to a total metal concentration for use in waste load limit calculations. When waste discharge limits are to be developed and TMDLs are determined for a receiving waterbed, the dissolved criterion must be "translated" back to a total concentration because TMDLs will continue to be based on total metals.

EPA provides three methods in which the translation of dissolved criteria to field measurements of total metal may be implemented. These three methods may potentially result in greatly different outcomes relative to particulate metal loading. These methods are:

1. Determination of a site specific translator by measuring site specific ratios of dissolved metal to total metal and then dividing the dissolved criterion by this translator. As an example: a site specific ratio of 0.4 (40% of the metal in the site water is dissolved) would result in a 2.5 fold increase in the discharge of total metal. The higher the fraction of particulate metal in the site water the greater the allowable discharge of total metal. See the discussion and Table 9 below. This is EPA's preferred method.

2. Theoretical partitioning relationship. This method is based on a partitioning coefficient determined empirically for each metal and when available the concentration of total suspended solids in the site-specific receiving water.

3. The translator for a metal is assumed to be equivalent to the criteria guidance conversion factor for that metal (use the same value to convert from total to dissolved and back again). Since translators are needed to calculate discharge limits they become important in determining the total metals allowed to be discharged (see also loading discussion for individual metals below.

In the economic analysis performed by the EPA and evaluated by the State Board (SWRCB 1997), it was estimated that translators based on site-specific data would decrease discharger's costs of implementing the new CTR criteria by 50 percent. This cost savings is "directly related to the less stringent effluent limitations that result from the use of site-specific translators." This implies a strong economic incentive for dischargers to reduce costs by developing site-specific translators and ultimately being allowed to discharge more total metals. This conclusion regarding the impact of site-specific translators is supported by documents received from EPA (USEPA 1997d).

EPA performed a sensitivity analysis on the effect of the site-specific translator, which relies on determining the ratio of metal in water after filtration to metal in water before filtration in downstream waters. EPA's analysis indicated that use of a site-specific translators to calculate criteria would result in greater releases of toxic-weighted metals loads above the option where the Cfs are used as the translators. The potential difference was estimated to be between 0.4 million and 2.24 million "toxic weighted" pounds of metals discharged to California waterways.

The Services believe that the current use of conversion factors and site specific translators in formula-based metal criteria are not sufficiently protective of threatened and endangered aquatic species because:

1. Particulate metals have been removed from the regulatory equation even though chemical, physical, and biological activity can subsequently cause these particulate metals to become bioavailable;

2. The criteria are developed using toxicity tests that expose test organisms to metal concentrations with very low contributions from particulate metals;

3. Toxicity tests do not assess whether the toxic contributions of particulate metals are negligible when particulate concentrations are great and dissolved concentrations are at or near criteria levels;

4. This method has the potential to significantly increase the discharge of total metal loads into the environment even though dissolved metal criteria are being met by a discharger; and

5. The premise ignores the fact that water is more than a chemical medium; it also physically delivers metals to the sediments."

The Services believe that the CTR proposed formula-based metal criteria is not protective of threatened or endangered aquatic species because total metal discharges will likely increase and the criteria development methods do not adequately consider the environmental fate, transport, and transformation of metals in natural environments.

The US Fish and Wildlife Service (Service) and the National Marine Fisheries Service (NMFS) biological opinion requires that whenever a threatened or endangered species is present downstream from a discharge where a State developed translator will be used, EPA will work with the permitting authority to ensure that appropriate information, which may be needed to calculate the translator in accordance with the applicable guidance, will be obtained and used.

Appropriate information includes:

1. Ambient and effluent acute and chronic toxicity data;
2. Bioassessment data; and/or
3. An analysis of the potential effect s of the metals using sediment guidelines, biocriteria and residue-based criteria for shellfish to the extent such guidelines and criteria exist and are applicable to the receiving water body.

EPA, in cooperation with the Services, will review these discharges and associated monitoring data and permit limits, to determine the potential for the discharge to impact federally listed species and/or critical habitats. If discharges are identified that have the potential to adversely affect federally listed species and/or critical habitat, EPA will work with the Services and the State of California in accordance with procedures agreed to by the Agencies in the draft MOA

published in the Federal Register at 64 FR 2755 (January 15, 1999) or any modifications to those procedures agreed to in a finalized MOA.

8. The proposed Permit contains an allowance for a mixing zone that does not comply with the requirements of the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (SIP) or the Basin Plan.

"A mixing zone is an area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented" according to EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD) (USEPA, 1991), (Water quality criteria must be met at the edge of a mixing zone.) Mixing zones are regions within public waters adjacent to point source discharges where pollutants are diluted and dispersed at concentrations that routinely exceed human health and aquatic life water quality standards (the maximum levels of pollutants that can be tolerated without endangering people, aquatic life, and wildlife.) Mixing zone policies allow a discharger's point of compliance with state and federal water quality standards to be moved from the "end of the pipe" to the outer boundaries of a dilution zone. The CWA was adopted to minimize and eventually eliminate the release of pollutants into public waters because fish were dying and people were getting sick. The CWA requires water quality standards (WQS) be met in all waters to prohibit concentrations of pollutants at levels assumed to cause harm. Since WQS criteria are routinely exceeded in mixing zones it is likely that in some locations harm is occurring. The general public is rarely aware that local waters are being degraded within these mixing zones, the location of mixing zones within a waterbody, the nature and quantities of pollutants being diluted, the effects the pollutants might be having on human health or aquatic life, or the uses that may be harmed or eliminated by the discharge. Standing waist deep at a favorite fishing hole, a fisherman has no idea that he is in the middle of a mixing zone for pathogens for a sewage discharger that has not been required to adequately treat their waste.

In 1972, backed by overwhelming public support, Congress overrode President Nixon's veto and passed the Clean Water Act. Under the CWA, states are required to classify surface waters by *uses* – the beneficial purposes provided by the waterbody. For example, a waterbody may be designated as a drinking water source, or for supporting the growth and propagation of aquatic life, or for allowing contact recreation, or as a water source for industrial activities, or all of the above. States must then adopt *criteria* – numeric and narrative limits on pollution, sufficient to protect the uses assigned to the waterbody. *Uses + Criteria = Water Quality Standards (WQS).* WQS are regulations adopted by each state to protect the waters under their jurisdiction. If a waterbody is classified for more than one use, the applicable WQS are the criteria that would protect the most sensitive use.

All wastewater dischargers to surface waters must apply for and receive a permit to discharge pollutants under the National Pollutant Discharge Elimination System (NPDES.) Every NPDES permit is required to list every pollutant the discharger anticipates will be released, and establish effluent limits for these pollutants to ensure the discharger will achieve WQS. NPDES permits

also delineate relevant control measures, waste management procedures, and monitoring and reporting schedules.

It is during the process of assigning effluent limits in NPDES permits that variances such as mixing zones alter the permit limits for pollutants by multiplying the scientifically derived water quality criteria by dilution factors. The question of whether mixing zones are legal has never been argued in federal court.

Mixing zones are never mentioned or sanctioned in the CWA. To the contrary, the CWA appears to speak against such a notion:

> "whenever…the discharges of pollutants from a point source…would interfere with the attainment or maintenance of that water quality…which shall assure protection of public health, public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water, effluent limitations…shall be established which can reasonably be expected to contribute to the attainment or maintenance of such water quality."

A plain reading of the above paragraph calls for the application of effluent limitations whenever necessary to assure that *WQS will be met in all waters*. Despite the language of the Clean Water Act; US EPA adopted 40 CFR 131.13, General policies, that allows States to, at their discretion, include in their State standards, policies generally affecting their application and implementation, such as mixing zones, low flows and variances. According to EPA; (EPA, Policy and Guidance on Mixing Zones, 63 Fed Reg. 36,788 (July 7, 1998)) as long as mixing zones do not eliminate beneficial uses in the whole waterbody, they do not violate federal regulation or law. California has mixing zone policies included in individual Water Quality Control Plans (Basin Plans) and the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (2005) permitting pollutants to be diluted before being measured for compliance with the state's WQS.

Federal Antidegradation regulations at 40 CFR 131.12 require that states protect waters at their present level of quality and that all beneficial uses remain protected. The corresponding State Antidegradation Policy, Resolution 68-16, requires that any degradation of water quality not unreasonably affect present and anticipated beneficial uses. Resolution 68-16 further requires that: "Any activity which produces or may produce or increase 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 the maximum benefit to the people of the State will be maintained."

- Pollution is defined in the California Water Code as an alteration of water quality to a degree which unreasonably affects beneficial uses. In California, Water Quality Control Plans (Basin Plans) contain water quality standards and objectives which are necessary to protect beneficial uses. The Basin Plan for California's Central Valley Regional Water

Board states that: "According to Section 13050 of the California Water Code, Basin Plans consist of a designation or establishment for the waters within a specified area of beneficial uses to be protected, water quality objectives to protect those uses, and a program of implementation needed for achieving the objectives. State law also requires that Basin Plans conform to the policies set forth in the Water Code beginning with Section 13000 and any state policy for water quality control. Since beneficial uses, together with their corresponding water quality objectives, can be defined per federal regulations as water quality standards, the Basin Plans are regulatory references for meeting the state and federal requirements for water quality control (40 CFR 131.20)."

- Nuisance is defined in the California Water Code as anything, which is injurious to health, indecent, offensive or an obstruction of the free use of property, which affects an entire community and occurs as a result of the treatment or disposal of waste.

The Antidegradation Policy (Resolution 68-16) allows water quality to be lowered as long as beneficial uses are protected (pollution or nuisance will not occur), best practicable treatment and control (BPTC) of the discharge is provided, and the degradation is in the best interest of the people of California. Water quality objectives were developed as the maximum concentration of a pollutant necessary to protect beneficial uses and levels above this concentration would be considered pollution. The Antidegradation Policy does not allow water quality standards and objectives to be exceeded. Mixing zone are regions within public waters adjacent to point source discharges where pollutants are diluted and dispersed at concentrations that routinely exceed water quality standards.

The Antidegradation Policy (Resolution 68-16) requires that best practicable treatment or control (BPTC) of the discharge be provided. Mixing zones have been allowed in lieu of treatment to meet water quality standards at the end-of-the-pipe prior to discharge. To comply with the Antidegradation Policy, the trade of receiving water beneficial uses for lower utility rates must be in the best interest of the people of the state and must also pass the test that the Discharger is providing BPTC. By routinely permitting excessive levels of pollutants to be legally discharged, mixing zones act as an economic disincentive to Dischargers who might otherwise have to design and implement better treatment mechanisms. Although the use of mixing zones may lead to individual, short-term cost savings for the discharger, significant long-term health and economic costs may be placed on the rest of society. An assessment of BPTC, and therefore compliance with the Antidegradation Policy, must assess whether treatment of the wastestream can be accomplished, is feasible, and not simply the additional costs of compliance with water quality standards. A BPTC case can be made for the benefits of prohibiting mixing zones and requiring technologies that provide superior waste treatment and reuse of the wastestream.

EPA's Water Quality Standards Handbook states that: "It is not always necessary to meet all water quality criteria within the discharge pipe to protect the integrity of the waterbody as a whole." The primary mixing area is commonly referred to as the zone of initial dilution, or ZID. Within the ZID acute aquatic life criteria are exceeded. To satisfy the CWA prohibition against the discharge of toxic pollutants in toxic amounts, regulators assume that if the ZID is small, significant numbers of aquatic organisms will not be present in the ZID long enough to encounter acutely toxic conditions. EPA recommends that a ZID not be located in an area

populated by non-motile or sessile organisms, which presumably would be unable to leave the primary mixing area in time to avoid serious contamination.

Determining the impacts and risks to an ecosystem from mixing pollutants with receiving waters at levels that exceed WQS is extremely complex. The range of effects pollutants have on different organisms and the influence those organisms have on each other further compromises the ability of regulators to assess or ensure "acceptable" short and long-term impacts from the use of mixing zones. Few if any mixing zones are examined prior to the onset of discharging for the potential effects on impacted biota (as opposed to the physical and chemical fate of pollutants in the water column). Biological modeling is especially challenging – while severely toxic discharges may produce immediately observable effects, long-term impacts to the ecosystem can be far more difficult to ascertain. The effects of a mixing zone can be insidious; impacts to species diversity and abundance may be impossible to detect until it is too late for reversal or mitigation.

The *CALIFORNIA CONSTITUTION, ARTICLE 10, WATER, SEC. 2* states that: "It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare. The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water. Riparian rights in a stream or water course attach to, but to no more than so much of the flow thereof as may be required or used consistently with this section, for the purposes for which such lands are, or may be made adaptable, in view of such reasonable and beneficial uses; provided, however, that nothing herein contained shall be construed as depriving any riparian owner of the reasonable use of water of the stream to which the owner's land is riparian under reasonable methods of diversion and use, or as depriving any appropriator of water to which the appropriator is lawfully entitled. This section shall be self-executing, and the Legislature may also enact laws in the furtherance of the policy in this section contained." The granting of a mixing zone is an unreasonable use of water when proper treatment of the wastestream can be accomplished to meet end-of-pipe limitations. Also contrary to the California Constitution, a mixing zone does not *serve the beneficial use;* to the contrary, beneficial uses are degraded within the mixing zone.

The Central Valley Regional Water Quality Control Board's Basin Plan, page IV-16.00, requires the Regional Board use EPA's *Technical Support Document for Water Quality Based Toxics Control (TSD)* in assessing mixing zones. The TSD, page 70, defines a first stage of mixing, close to the point of discharge, where complete mixing is determined by the momentum and buoyancy of the discharge. The second stage is defined by the TSD where the initial momentum and buoyancy of the discharge are diminished and waste is mixed by ambient turbulence. The TSD goes on to state that in large rivers this second stage mixing may extend for miles. The TSD, Section 4.4, requires that if complete mix does not occur in a short distance mixing zone monitoring and modeling must be undertaken.

The State's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (SIP), Section 1.4.2.2, contains requirements for a mixing zone study which must be analyzed before a mixing zone is allowed for a wastewater discharge. Properly adopted state Policy requirements are not optional. The proposed Effluent Limitations in the proposed Permit are not supported by the scientific investigation that is required by the SIP and the Basin Plan.

SIP Section 1.4.2.2 requires that a mixing zone shall not:

1. Compromise the integrity of the entire waterbody.
2. Cause acutely toxic conditions to aquatic life.
3. Restrict the passage of aquatic life.
4. Adversely impact biologically sensitive habitats.
5. Produce undesirable aquatic life.
6. Result in floating debris.
7. Produce objectionable color, odor, taste or turbidity.
8. Cause objectionable bottom deposits.
9. Cause Nuisance.
10. Dominate the receiving water body or overlap a different mixing zone.
11. Be allowed at or near any drinking water intake.

The proposed Permit's mixing zones have not addressed a single required item of the SIP. A very clear unaddressed requirement (SIP Section 1.4.2.2) for mixing zones is that the point(s) in the receiving stream where the applicable criteria must be met shall be specified in the proposed Permit. The "edge of the mixing zone" has not been defined.

Few mixing zones are adequately evaluated to determine whether the modeling exercise was in fact relevant or accurate, or monitored over time to assess the impacts of the mixing zone on the aquatic environment. The sampling of receiving waters often consists of analyzing one or two points where the mixing zone boundary is supposed to be – finding no pollution at the mixing zone boundary is often considered proof that mixing has been "successful" when in fact the sampling protocol might have missed the plume altogether.

In this case, as presented in the proposed Permit, Fact Sheet, pages F-28 through F-30, states that:

> "The effluent is discharged through a 36-inch diameter pipe located on the side bank, which provides minimal dilution. The effluent is discharged into a tidally influenced section of the San Joaquin River, in which, under critical low flow conditions, flow reversals may occur on the flood tide and prolonged near-slack water conditions may occur for various combinations of tide and San Joaquin River flow. Flow direction reversals can potentially cause accumulation of effluent and double dosing.
>
> The Discharger developed a model in 2002 to assess dilution and mixing zones. Hydrodynamic modeling was performed using the RMA-10 model and the results were published in *Analysis of the Fate and Water Quality Impacts of the City of Manteca Discharge* (Resource Management Associates, 10 October 2000). The results of the

> hydrodynamic modeling were utilized in the water quality analysis that was published in *Water Quality Analysis of Surface Water Discharge* (Larry Walker Associates, October 2000). These studies demonstrated that at the permitted design flow of 9.87 mgd, the minimum dilution for chronic aquatic life criteria was 4:1 with a mixing zone that hugs the eastern shore and extends 450 feet north of the outfall, and as a result, Order No. R5-2004-0028 granted a 4:1 dilution credit for chronic aquatic criteria constituents. For human health criteria, Order No. R5-2004-0028 granted a dilution credit up to 222:1 based on safe exposure levels for lifetime exposure utilizing the harmonic mean flow at Vernalis. But, for the acute aquatic criteria, the Regional Water Board, in Order No. R5-2004-0028, did not designate any dilution within the immediate vicinity of the outfall because of the limited mixing of the side-bank discharge near the outfall and the periods of slack tide that can occur at low river flows. The accuracy of the model results was questionable due in part to a lack of site data to calibrate and validate the model, and therefore, Order No. R5-2004-0028 also required the Discharger to install a flow monitoring station in the vicinity of the outfall to provide real-time data to better assess available dilution.
>
> Finally, for the Human Health criteria, the resultant analysis based on this dilution study demonstrated that at 5280 feet north of the discharge a dilution credit for the flow of 9.87 mgd was 93:1 and for the flow of 17.5 mgd was 52:1, and that concentrations become fully mixed across the channel cross-section at approximately 5400 feet north of the outfall. This is appropriate, because for long-term human health criteria, the environmental effects are expected to occur far downstream of the discharge point where the discharge is completely mixed. Furthermore, the mixing zone is as small as practicable, will not compromise the integrity of the entire water body, restrict the passage of aquatic life, dominate the waterbody or overlap existing mixing zones from different outfalls. The discharge is approximately 20 miles from the nearest drinking water intake. Based on these findings, this Order grants human health dilution credits on a case-by-case basis."

We insert the follow excerpt from the State Board's Draft Order (A-1971) dated 4 August 2009 for the City of Stockton's petitioned NPDES permit:

> "Concerning the mixing zone for human health criteria, the Permit increases the dilution credit from 10:1 in the prior permit to 13:1 in this Permit. As we have state in other orders, dilution credit can be granted for a completely-mixed discharge, but if the discharge is not completely-mixed, the discharger must c0nduct a study to support the dilution credit.[15] The SIP states: "completely-mixed discharge condition means not more than a 5 percent difference, accounting for the analytical variability, in the concentration of a pollutant exists across a transect of the water body at a point within two stream/river widths from the discharge point." In applying his definition, it is important that there be confirmation that the discharge is completely-mixed across the river transect at the downstream mixing zone boundary. Our prior order concerning this Facility's discharge discusses hat the Central Valley Water Board found numerous flaws and areas of uncertainty regarding the reliability of dilution studies and adequacy of existing models at that

> time to support a mixing zone and dilution credits. [16] In this case, the record does not include any more recent field study or modeling to confirm that the discharge is completely-mixed. Instead, upon granting a mixing that extends into the Channel, the Central Valley Water Board simply assumed that there would be complete mixing at some location "far downstream." It is quite possible that there is complete mixing, in light of the size of mixing zone granted, the turbulence within the river, and the river bends and channel configuration. But there is no diffuser from the Facility and it is certainly possible that the discharge would not completely mix, even after a lengthy river transport. The issue should be remanded to the Central Valley Water Board for confirmation. The boundaries of the mixing zone are also not clearly defined. [17] This should also be corrected in the remand."

Again the Regional Board does not state whether the discharge is completely mixed using the SIP definition and simply bases its allowance for a human health mixing zone on their citation that "the environmental effects are expected to occur far downstream of the discharge point". Again the Regional Board also does not identify the point of compliance within the receiving stream.

9. The proposed 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).

Proposed Permit, State Implementation Policy states that: **"**On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000 with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Board in the Basin Plan. The SIP became effective on May 18, 2000 with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP."

The SIP, Section 4, Toxicity Control Provisions, Water Quality-Based Toxicity Control, states that: "A chronic toxicity effluent limitation is required in permits for all dischargers that will cause, have a reasonable potential to cause, or contribute to chronic toxicity in receiving waters." The SIP is a state *Policy* and CWC Sections 13146 and 13247 require that the Board in carrying out activities which affect water quality shall comply with state policy for water quality control unless otherwise directed by statute, in which case they shall indicate to the State Board in writing their authority for not complying with such policy.

Federal regulations, at 40 CFR 122.44 (d)(1)(i), require that limitations must control all pollutants or pollutant parameters which the Director determines are or may be discharged at a level which will cause, or contribute to an excursion above any State water quality standard,

including state narrative criteria for water quality. There has been no argument that domestic sewage contains toxic substances and presents a reasonable potential to cause toxicity if not properly treated and discharged. The Water Quality Control Plan for the Sacramento/ San Joaquin River Basins (Basin Plan), Water Quality Objectives (Page III-8.00) for Toxicity is a narrative criteria which 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. The Proposed Permit contains a narrative Effluent Limitation prohibiting the discharge of chronically toxic substances: however a *Compliance Determination* has been added to the proposed Permit: "Compliance with the accelerated monitoring and TRE/TIE provisions of Provision VI.C.2.a shall constitute compliance with effluent limitations contained in sections IV.A.1.d and IV.B.1.d of this Order for chronic whole effluent toxicity ". The *Compliance Determination* nullifies the Effluent Limitation and makes toxic discharges unenforceable.

The proposed Permit includes the following: "I. Chronic Whole Effluent Toxicity Effluent Limitation. Compliance with the accelerated monitoring and TRE/TIE provisions of Provision VI.C.2.a shall constitute compliance with effluent limitations IV.A.1.g and IV.A.2.g for chronic whole effluent toxicity."

The Basin Plan narrative Toxicity Objective states that: "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. Compliance with this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests of appropriate duration or other methods as specified by the Regional Board."

According to the Basin Plan toxicity sampling is required to determine compliance with the requirement that all waters be maintained free of toxic substances. Sampling does not equate with or ensure that waters are free of toxic substances. The Tentative Permit requires the Discharger to conduct an investigation of the possible sources of toxicity if a threshold is exceeded. This language is not a limitation and essentially eviscerates the Regional Board's authority, and the authority granted to third parties under the Clean Water Act, to find the Discharger in violation for discharging chronically toxic constituents. An enforceable effluent limitation for chronic toxicity must be included in the Order.

10. The proposed Permit fails to contain an Effluent Limitation for bis(2-ethylhexyl)phthalate despite a clear reasonable potential to exceed waste quality standards in violation of Federal Regulations 40 CFR 122.44.

Bis(2-ethylhexyl)phthalate exceeds water quality standards in the receiving stream at 2.0 µg/l, above the CTR Water Quality Standard of 1.8 µg/l. Bis(2-ethylhexyl)phthalate has been detected in the wastewater effluent at 2.0 µg/l, also above the CTR Water Quality Standard. The proposed Permit Fact Sheet states that the receiving water and effluent sampling data for bis(2-ethylhexyl)phthalate is subject to error and is being discarded. If as the Regional Board contends, that the samples were contaminated by laboratory equipment or plastic sampling

bottles, this would be revealed in analysis of the sampling or travel blank analysis or documentation from the laboratory quality assurance/quality control (QA/QC) documents. Apparently, all in place standard practices which would reveal any sampling and analysis errors have been ignored. Bis(2-ethylhexyl)phthalate is used in the formation of plastics and has been documented in the available literature to be present in plastic pipes, bottles, bags and widely distributed throughout the environment. The Regional Board total disregards scientific methods, specifically sampling and laboratory QA/QC methodologies, in throwing out data points that would lead to a reasonable potential for a pollutant to exceed water quality standards when the burden should properly be placed on wastewater Dischargers to conduct proper sampling and analysis. The California Water Code (CWC), Section 13377 states in part that: "…the state board or the regional boards shall…issue waste discharge requirements…which apply and ensure compliance with …water quality control plans, or for the protection of beneficial uses…" Section 122.44(d) of 40 CFR requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. US EPA has interpreted 40 CFR 122.44(d) in *Central Tenets of the National Pollutant Discharge Elimination System (NPDES) Permitting Program* (Factsheets and Outreach Materials, 08/16/2002) that; although States will likely have unique implementation policies there are certain tenets that may not be waived by State procedures. These tenets include that "where valid, reliable, and representative effluent data or instream background data are available they MUST be used in applicable reasonable potential and limits derivation calculations. Data may not be arbitrarily discarded or ignored." Federal Regulations, 40 CFR 122.44(d), requires that limits must be included in permits where pollutants will cause, have reasonable potential to cause, or contribute to an exceedance of the State's water quality standards. US EPA has interpreted 40 CFR 122.44(d) in *Central Tenets of the National Pollutant Discharge Elimination System (NPDES) Permitting Program* (Factsheets and Outreach Materials, 08/16/2002) that although States will likely have unique implementation policies there are certain tenets that may not be waived by State procedures. These tenets include that "where calculations indicate reasonable potential, a specific numeric limit MUST be included in the permit. Additional "studies" or data collection efforts may not be substituted for enforceable permit limits where "reasonable potential" has been determined." The Regional Board has failed to use valid, reliable and representative data in developing limitations, contrary to the cited Federal Regulation. Failure to include an effluent limitation for bis(2-ethylhexyl)phthalate in the proposed permit violates 40 CFR 122.44 and CWC 13377.

11. The proposed Permit contains an Effluent Limitation for aluminum that is not protective of the beneficial uses of the receiving stream contrary to federal regulations 40 CFR 122.44.

The proposed Permit states that: "Order No. R5-2004-0028 requires that the effluent comply with a maximum daily effluent limit of 140 _g/L and a monthly average effluent limit of 71 _g/L based on USEPA developed National Recommended Ambient Water Quality Criteria (NAWQC) for protection of freshwater aquatic life for aluminum. However, NAWQC based the chronic criterion on specific receiving water conditions where there is low pH (below 6.5) and low hardness levels (below 50 mg/L as CaCO3). Since the hardness values in the San Joaquin River are higher, which decreases the toxic effects to aquatic life, than the water hardness values in which the criterion was developed, USEPA advises that a water effects ratio (WER) might be

appropriate to better reflect the actual toxicity of aluminum to aquatic organisms. The Discharger submitted its final Aluminum WER Study, *City of Manteca Aluminum Water-Effects Ratio (WER) Study* dated March 2007, which recommends a WER of 22.7 applicable to the chronic objectives. As allowed by Section 1.2 of the SIP, the Regional Water Board adjusted the chronic objectives by the Discharger's site-specific WER of 22.7. As a result, this Order contains a final MDEL for aluminum of 750 _g/L and a AMEL of 407 _g/L. The Regional Water Board finds that applying the site-specific WER of 22.7 to the chronic criterion for aluminum, which relaxes the effluent limitations, is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16. Any impact on existing water quality will be insignificant.

Federal Regulations, 40 CFR 122.44 (d)(i), requires that; "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." The Basin Plan contains a narrative water quality objective for toxicity that states in part that "[a]*ll waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life*" (narrative toxicity objective). Where numeric water quality objectives have not been established, 40 CFR §122.44(d) specifies that WQBELs may be established using USEPA criteria guidance under CWA section 304(a), proposed State criteria or a State policy interpreting narrative criteria supplemented with other relevant information, or an indicator parameter. U.S. EPA developed National Recommended Ambient Water Quality Criteria for protection of freshwater aquatic life for aluminum to prevent toxicity to freshwater aquatic life. The recommended ambient criteria four-day average (chronic) and one-hour average (acute) criteria for aluminum are 87 ug/*l* and 750 ug/*l*, respectively.

Freshwater Aquatic habitat is a beneficial use of the receiving stream. US EPA's 87 ug/l chronic criterion was developed using low pH and hardness testing. California Central Valley waters, the Sacramento River, at the Valley floor, have been sampled to have hardnesses as low as 39 mg/l $CaCO_3$ by the USGS in February 1996 for the *National Water Quality Assessment Program.* Contributory streams, especially foothill streams, have also been sampled and shown to contain even lower hardness levels. US EPA recognized in their ambient criteria development document, (Ambient water Quality Criteria for Aluminum, EPA 440/5-86-008) that the pH was in the range 6.5 to 6.6 and that the hardness was below 20 mg/l. Typical values for pH and hardness in the Central Valley alone warrant use of the chronic ambient criteria for aluminum. Despite the hardness and pH values used in the development of the criteria; U.S. EPA's conclusions in their *Ambient Criteria for the Protection of Freshwater Aquatic Life* recommends that application of the ambient criteria as necessary to be protective of the aquatic beneficial uses of receiving waters in lieu of site-specific criteria.

The Regional Board and their proposed Permit cites US EPA's *Ambient Criteria for the Protection of Freshwater Aquatic Life for Aluminum* (criteria) as not being representative or necessary because the chronic criteria were based on a low hardness and low pH. The Regional Board cites one section of the criteria development document but ignores the final recommendation to use the recommended criteria absent a site-specific objective for aluminum.

The Regional Board then defaults to the US EPA recommended acute criteria of 750 ug/l. The Regional Board's citation of the criteria development document is incomplete its review, for example the *criteria* development document (EPA 440/5-86-008) also cites that:

> 169 ug/l of aluminum caused a 24% reduction in the growth of young brook trout.
> 174 ug/l of aluminum killed 58% of the exposed striped bass.
> Bioaccumulation factors ranged from 50 to 231 for young brook trout exposed to aluminum for 15 days.
> Aluminum at 169 ug/l caused a 24% reduction in the weight of young brook trout.

Regional Board staff are not water quality standards development experts and do not have the knowledge or experience to override U.S. EPA's recommendations regarding water quality criteria. US EPA recommends that understanding the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* is necessary in order to understand the text, tables and calculations of a criteria document. The Regional Board's assessment of the use of low hardness and low pH clearly shows they did not heed EPA's advice in reviewing the criteria development procedures for water quality criteria or the final recommendations. The Regional Board occasionally cites individual aluminum toxicity testing at Yuba City; again individual testing is not a valid replacement for developing fully protective criteria. A prime example of a state utilizing good water quality standards development techniques for developing a site specific standard for aluminum is the state of Indiana where a final chronic criterion of 174 ug/l was established in 1997. In 2003, Canada adopted pH dependant freshwater aquatic life criteria for aluminum that ranges from 84 ug/l to 252 ug/l. Ignoring the final recommendation of the criteria misses the protective intermediate measures to protect against mortality and reductions to growth and reproduction. The Regional Board's single use of the acute criteria for aluminum is not protective of the beneficial uses of the receiving stream.

Federal Regulations, 40 CFR 122.44 (d)(i), requires that; "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." US EPA has interpreted 40 CFR 122.44(d) in *Central Tenets of the National Pollutant Discharge Elimination System (NPDES) Permitting Program* (Factsheets and Outreach Materials, 08/16/2002) that although States will likely have unique implementation policies there are certain tenets that may not be waived by State procedures. These tenets include that "where valid, reliable, and representative effluent data or instream background data are available they MUST be used in applicable reasonable potential and limits derivation calculations. Data may not be arbitrarily discarded or ignored." The California Water Code (CWC), Section 13377 states in part that: "…the state board or the regional boards shall…issue waste discharge requirements… which apply and ensure compliance with …water quality control plans, or for the protection of beneficial uses…" Section 122.44(d) of 40 CFR requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. A water quality standard for Failure to include an effluent limitation for aluminum in the proposed permit violates 40 CFR 122.44 and CWC 13377.

On March 24, 2000 the US Fish and Wildlife Service (Service) and the National Marine Fisheries Service (NMFS) issued a biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act). The biological opinion was issued to the U.S. Environmental Protection Agency, Region 9, with regard to the "Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" (CTR)". The document represented the Services' final biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act). The biological opinion contained the following discussion with regard to water effects ratios (WERs).

"Formulas for all the hardness dependant metals also include a Water Effects Ratio (WER), a number that acts as a multiplication factor. If no site-specific WER is determined, then the WER is presumed to be 1 and would not modify a formula result. A WER purportedly accounts for the difference in toxicity of a metal in a site water relative to the toxicity of the same metal in reconstituted laboratory water. The contention is that natural waters commonly contain constituents which "synthetic" or "reconstituted" laboratory waters lack, such as dissolved organic compounds, that may act to bind metals and reduce their bioavailability. Where such constituents act to modify the toxicity of a metal in a site water compared to the toxicity of the same metal in laboratory water, a "water effect" is observed.

Example WER calculation:

Suppose the LC50 of Cu in site water is 30 _g/L.
Suppose the LC50 of Cu in laboratory water is 20 _g/L.
Assume a site hardness of 40 mg/L.
The freshwater conversion factor (CF) for Cu = 0.96.

$$WER = \frac{\text{Site } \mathbf{LC50}}{\text{Lab } \mathbf{LC50}} = \frac{30\ \_g/L}{20\ \_g/L} = 1.5$$

Cu Site-Specific CCC = WER x CF x $e^{(m[\ln(4\ 0)]+b)}$
= 1.5 x 0.96 x 4.3
= 6.2 _g/L

What follows are discussions of the Services' concerns regarding the applications of WER, CF and the attendant translators, and deficiencies of the hardness-dependent factors in formula-based determinations of criteria for As, Cd, Cr (III), Cr (VI), Cu, Pb, Hg, Ni, Se (in saltwater), Ag, and Zn.

Water Effect Ratios

Except in waters that are extremely effluent-dominated, WERs are > 1 and result in higher numeric criteria. Note that, in the examples above, use of a site-specific WER for copper raised the criterion concentration allowed at the site from 4.1 _g/L to 6.2 _g/L, an increase of 50 percent. A WER may be more important than site water hardness or metal-specific conversion factors and translators in determining a criterion and hence the metal loading allowed (see hardness and ading discussions below).

EPA has published guidelines for determining a site-specific WER, which outline procedures for water sampling, toxicity testing, acclimating test organisms, etc. (USEPA 1994). When site water toxicity is lower than laboratory water toxicity, criteria may be raised because: 1) differences in calcium to magnesium ratios in hardness between laboratory water and site water can significantly alter the WER; 2) toxicity testing for WER development is not required across the same range of test organisms used in criteria development; and 3) the inherent variabilities associated with living organisms used in toxicity testing can be magnified when used in a ratio. EPA guidelines for WER determinations (USEPA 1994) instruct users to reconstitute laboratory waters according to protocols that result in a calcium-to-magnesium ratio of ~0.7 across the range of hardness values (USEPA 1989, 1991). This proportion (~0.7) of calcium to magnesium is far less than the ratio found in most natural waters (Welsh *et al*. 1997). The Services agree with Welsh *et al*. (1997) that imbalances in Ca-to-Mg ratios between site waters and dilution waters may result in WERs which are overestimated because calcium ions are more protective of metals toxicity than are magnesium ions. The EPA has noted this problem with determining WERs but limits the suggested correction of matching the laboratory Ca-to-Mg ratio and the site ratio to a single sentence at the end of the proposed rule. Thus, the significance and correction of this problem is not adequately addressed.

EPA metal criteria are based on over 900 records of laboratory toxicity tests (USEPA 1992) using hundreds of thousands of individual test organisms, including dozens of species across many genera, trophic levels, and sensitivities to provide protection to an estimated 95 percent of the genera most of the time (USEPA 1985f). The use of a ratio based WER determined with 2 or 3 test species limits the reliability of the resultant site-specific criteria and calls into question the level of protection provided for families or genera not represented in the WER testing. The inherent variability of toxicity testing can also have a significant effect on the final WER determination, especially because it is used in a ratio. As discussed above, the EPA has developed its criteria based on a relatively large database. However, even with such a large database variability in test results can still cause difficulty in determining a criteria value. For example, Cd data were so variable that EPA abandoned the acute to chronic ratio method of determining the chronic criterion (USEPA 1985b). Instead, EPA applied the acute method to derive a chronic value. The EPA criteria document for Cd (USEPA 1985b) notes a chronic value for Chinook salmon of 1.563 _g/L with a range of 1.3 to 1.88 _g/L. This is a variability of 17 percent in either direction, which is rather good (inter and intra laboratory variability higher than 17 percent is not unusual). Therefore, if this data is used in a ratio such as a WER, the variability alone could result in a 34 percent difference in the values used. A potential WER using such data could range from 0.7 to 1.4. Thus, a site-specific criteria could increase by 40 percent due to natural variability in the toxicity testing alone. In development of a site-specific WER, fewer tests are conducted and with fewer species, increasing the likelihood that natural variation in toxicity test results could affect the outcome. Care should also be taken to make sure that test

results between lab and site water are significantly different. If 95 percent confidence intervals for the tests overlap then they are likely not significantly different and should not be used to determine a WER. Thus, toxicity tests should be conducted and carefully evaluated to minimize experimental variance when collecting data to calculate WERs.

Zooplanktons such as cladocerans (Daphnia sp.) are commonly used in bioassays to determine national and site-specific criteria or develop WERs and translation factors. As sensitive as cladocerans seem to be it is possible that the life stage of cladocerans being used in most bioassays are not the most sensitive. Shurin and Dodson (1997) found that sexual reproduction in cladocerans is more sensitive to toxicants than the asexual reproductive stage and that most bioassays utilize daphnia during the asexual phase because they are well fed and cultured under low stress situations. Under stress (low temperature, drought, low food supply) cladocerans and other zooplankton use sexual reproduction to produce resting eggs that can remain dormant for months to years until more favorable conditions return. The loss or a decrease in the production of resting eggs can have a significant long-term effect on the populations of these species. Snell and Carmona (1995) found that for a rotifer zooplankton, sexual reproduction was more strongly affected by several toxicants, including cadmium, than asexual reproduction. The authors concluded that the "level of toxicants presently allowable in surface waters . . . may expose zooplankton populations to greater ecological risks than is currently believed." Other metals may also be more toxic to the sexual stage of zooplankton adding additional doubt to the protectiveness of some criteria and WERs.

Procedures for acclimation of test organisms prior to toxicity testing may also be inadequate to assure meaningful comparisons between site and laboratory waters. For the reasons stated above, the Services believe that the EPA procedures for determining WERs for metals may result in criteria that are not protective of threatened or endangered aquatic species. Thus, WERs of three (3) or less are unacceptable because they are likely within the variance of the toxicity tests. WERs over three must be carefully developed and evaluated to ensure that listed species will be protected." The agencies agreed that: "EPA, in cooperation with the Services, will issue a clarification to the *Interim Guidance on the Determination and Use of Water-Effect Ratios for Metals* (EPA 1994) concerning the use of calcium-to-magnesium ratios in laboratory water, which can result in inaccurate and under-protective criteria values for federally listed species considered in the Services' opinion. EPA, in cooperation with the Services, will also issue a clarification to the *Interim Guidance* addressing the proper acclimation of test organisms prior to testing in applying water-effect ratios (WERs)."

12. The proposed 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.

The proposed Permit allows for a substantial increase in flow and therefore in the mass of all pollutants discharged to surface waters. The proposed permit summarizes without any detail an Antidegradation analysis performed by the Dischargers consultants. The proposed permit states how the analysis was conducted but fails to present the results of the analysis, which is the basis for the permit. Federal Regulation, 40 CFR 124.6 (e)(*Applicable to State Programs*), requires

that all draft permits shall be accompanied by a statement of basis, shall be based on the administrative record, shall be publically noticed and made available for public comment. It is obviously difficult to present reasonable comments on a document for which only the methodology is presented and the facts and basis for conclusions are absent.

The Antidegradation Analysis analyzed pollutants that were based on one or more of the following conditions: 1) the Facility received an effluent limitation for a particular constituent, 2) the constituent was identified as a pollutant/stressor on the 303(d) list for selected Delta waterways, 3) an adopted TMDL exists downstream of the discharge, or 4) the constituent is a historic pollutant of concern in the Delta. The Antidegradation Analysis evaluated each selected pollutant detected in the effluent and receiving water to determine if the proposed discharge increase of 7.63 mgd authorized by this Order potentially allows significant increase of the amount of pollutants present in the upstream and downstream receiving water influenced by the proposed discharge. The Antidegradation analysis should have analyzed all detected constituents and their potential to impact water quality and the beneficial uses of receiving waters. There are thousands of unregulated chemicals discharged into the environment daily. It has been clearly shown that "constituents of emerging concern": i.e. endocrine disruptors, caffeine, antibiotics are having a great detrimental impact to surface waters but are not even discussed in the City's analysis. These subjects are relevant since chlorine usage, which once oxidized many of these constituents has ceased being used at the wastewater treatment plant. In other instances, such as bis(2-ethylhexyl)phthalate the Regional Board has failed to add Effluent Limitations because they question the accuracy of the data although the chemical has been shown to be ubiquitous. There is no discussion of temperature in the Fact Sheet, which indicates the wastewater treatment facility will be unable to meet objectives without construction of cooling towers. There is no discussion of EC for which the receiving stream is impaired and the discharge cannot meet limitations. Proposed Permit, Attachment G, shows that antimony, arsenic, cadmium, chromium, lead, mercury, nickel, selenium, silver, zinc, asbestos, carbon tetrachloride, dichlorobromomethane, methyl chloride, toluene, benzadine, bis(2ethylhexyl)phthalate, butylbenzyl phthalate, 1-4 dichlorobenzine, di-n-butyl phthalate, naphthalene, endrin aldehyde, iron, manganese and molybdenum were all detected in the wastewater effluent. There is no indication in the Antidegradation analysis discussion in the proposed Permit that any of these constituents were analyzed although they will all increase in the mass discharged to surface waters with the proposed expansion of the wastewater treatment plant. There is no indication that bioaccumulative substances were evaluated. There is no indication that additive toxicity was evaluated.

CWC Sections 13146 and 13247 require that the Board in carrying out activities which affect water quality shall comply with state policy for water quality control unless otherwise directed by statute, in which case they shall indicate to the State Board in writing their authority for not complying with such policy. The State Board has adopted the Antidegradation Policy (Resolution 68-16), which the Regional Board has incorporated into its Basin Plan. The Regional Board is required by the CWC to comply with the Antidegradation Policy.

Section 101(a) of the Clean Water Act (CWA), the basis for the antidegradation policy, states that the objective of the Act is to "restore and maintain the chemical, biological and physical integrity of the nation's waters." Section 303(d)(4) of the CWA carries this further, referring

explicitly to the need for states to satisfy the antidegradation regulations at 40 CFR § 131.12 before taking action to lower water quality. These regulations (40 CFR § 131.12(a)) describe the federal antidegradation policy and dictate that states must adopt both a policy at least as stringent as the federal policy as well as implementing procedures.

California's antidegradation policy is composed of both the federal antidegradation policy and the State Board's Resolution 68-16 (State Water Resources Control Board, Water Quality Order 86-17, p. 20 (1986) ("Order 86-17); Memorandum from Chief Counsel William Attwater, SWRCB to Regional Board Executive Officers, "federal Antidegradation Policy," pp. 2, 18 (Oct. 7, 1987) ("State Antidegradation Guidance")). As a state policy, with inclusion in the Water Quality Control Plan (Basin Plan), the antidegradation policy is binding on all of the Regional Boards (Water Quality Order 86-17, pp. 17-18).

Implementation of the state's antidegradation policy is guided by the State Antidegradation Guidance, SWRCB Administrative Procedures Update 90-004, 2 July 1990 ("APU 90-004") and USEPA Region IX, "Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12" (3 June 1987) (" Region IX Guidance"), as well as Water Quality Order 86-17.

The Regional Board must apply the antidegradation policy whenever it takes an action that will lower water quality (State Antidegradation Guidance, pp. 3, 5, 18, and Region IX Guidance, p. 1). Application of the policy does not depend on whether the action will actually impair beneficial uses (State Antidegradation Guidance, p. 6). Actions that trigger use of the antidegradation policy include issuance, re-issuance, and modification of NPDES and Section 404 permits and waste discharge requirements, waiver of waste discharge requirements, issuance of variances, relocation of discharges, issuance of cleanup and abatement orders, increases in discharges due to industrial production and/or municipal growth and/other sources, exceptions from otherwise applicable water quality objectives, etc. (State Antidegradation Guidance, pp. 7-10, Region IX Guidance, pp. 2-3). Both the state and federal policies apply to point and nonpoint source pollution (State Antidegradation Guidance p. 6, Region IX Guidance, p. 4).

The federal antidegradation regulations delineate three tiers of protection for waterbodies. Tier 1, described in 40 CFR § 131.12(a)(1), is the floor for protection of all waters of the United States (48 Fed. Reg. 51400, 51403 (8 Nov. 1983); Region IX Guidance, pp. 1-2; APU 90-004, pp. 11-12). It states that "[e]xisting instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." Uses are "existing" if they were actually attained in the water body on or after November 28, 1975, or if the water quality is suitable to allow the use to occur, regardless of whether the use was actually designated (40 CFR § 131.3(e)). Tier 1 protections apply even to those waters already impacted by pollution and identified as impaired. In other words, already impaired waters cannot be further impaired.

Tier 2 waters are provided additional protections against unnecessary degradation in places where the levels of water quality are better than necessary to support existing uses. Tier 2 protections strictly prohibit degradation unless the state finds that a degrading activity is: 1) necessary to accommodate important economic or social development in the area, 2) water quality is adequate to protect and maintain existing beneficial uses and 3) the highest statutory and regulatory requirements and best management practices for pollution control are achieved

(40 CFR § 131.12(a) (2)). Cost savings to a discharger alone, absent a demonstration by the project proponent as to how these savings are "necessary to accommodate important economic or social development in the area," are not adequate justification for allowing reductions in water quality (Water Quality Order 86-17, p. 22; State Antidegradation Guidance, p. 13). If the waterbody passes this test and the degradation is allowed, degradation must not impair existing uses of the waterbody (48 Fed. Reg. 51403). Virtually all waterbodies in California may be Tier 2 waters since the state, like most states, applies the antidegradation policy on a parameter-by-parameter basis, rather than on a waterbody basis (APU 90-004, p. 4). Consequently, a request to discharge a particular chemical to a river, whose level of that chemical was better than the state standards, would trigger a Tier 2 antidegradation review even if the river was already impaired by other chemicals.

Tier 3 of the federal antidegradation policy states "[w]here high quality waters constitute an outstanding national resource, such as waters of national and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water shall be maintained and protected (40 CFR § 131.12(a)(3)). These Outstanding National Resource Waters (ONRW) are designated either because of their high quality or because they are important for another reason (48 Fed. Reg. 51403; State Antidegradation Guidance, p. 15). No degradation of water quality is allowed in these waters other than short-term, temporary changes (Id.). Accordingly, no new or increased discharges are allowed in either ONRW or tributaries to ONRW that would result in lower water quality in the ONRW (EPA Handbook, p. 4-10; State Antidegradation Guidance, p. 15). Existing antidegradation policy already dictates that if a waterbody "should be" an ONRW, or "if it can be argued that the waterbody in question deserves the same treatment [as a formally designated ONRW]," then it must be treated as such, regardless of formal designation (State Antidegradation Guidance, pp. 15-16; APU 90-004, p. 4). Thus the Regional Board is required in each antidegradation analysis to consider whether the waterbody at issue should be treated as an ONRW. It should be reiterated that waters cannot be excluded from consideration as an ONRW simply because they are already "impaired" by some constituents. By definition, waters may be "outstanding" not only because of pristine quality, but also because of recreational significance, ecological significance or other reasons (40 CFR §131.12(a)(3)). Waters need not be "high quality" for every parameter to be an ONRW (APU 90-004, p. 4). For example, Lake Tahoe is on the 303(d) list due to sediments/siltation and nutrients, and Mono Lake is listed for salinity/TDC/chlorides but both are listed as ONRW.

The State Board's APU 90-004 specifies guidance to the Regional Boards for implementing the state and federal antidegradation policies and guidance. The guidance establishes a two-tiered process for addressing these policies and sets forth two levels of analysis: a simple analysis and a complete analysis. A simple analysis may be employed where a Regional Board determines that: 1) a reduction in water quality will be spatially localized or limited with respect to the waterbody, e.g. confined to the mixing zone; 2) a reduction in water quality is temporally limited; 3) a proposed action will produce minor effects which will not result in a significant reduction of water quality; and 4) a proposed activity has been approved in a General Plan and has been adequately subjected to the environmental and economic analysis required in an EIR. A complete antidegradation analysis is required if discharges would result in: 1) a substantial increase in mass emissions of a constituent; or 2) significant mortality, growth impairment, or reproductive impairment of resident species. Regional Boards are advised to apply stricter

scrutiny to non-threshold constituents, i.e., carcinogens and other constituents that are deemed to present a risk of source magnitude at all non-zero concentrations. If a Regional Board cannot find that the above determinations can be reached, a complete analysis is required.

Even a minimal antidegradation analysis would require an examination of: 1) existing applicable water quality standards; 2) ambient conditions in receiving waters compared to standards; 3) incremental changes in constituent loading, both concentration and mass; 4) treatability; 5) best practicable treatment and control (BPTC); 6) comparison of the proposed increased loadings relative to other sources; 7) an assessment of the significance of changes in ambient water quality and 8) whether the waterbody was a ONRW. A minimal antidegradation analysis must also analyze whether: 1) such degradation is consistent with the maximum benefit to the people of the state; 2) the activity is necessary to accommodate important economic or social development in the area; 3) the highest statutory and regulatory requirements and best management practices for pollution control are achieved; and 4) resulting water quality is adequate to protect and maintain existing beneficial uses. A BPTC technology analysis must be done on an individual constituent basis; while tertiary treatment may provide BPTC for pathogens, dissolved metals may simply pass through.

Any antidegradation analysis must comport with implementation requirements in State Board Water Quality Order 86-17, State Antidegradation Guidance, APU 90-004 and Region IX Guidance. The conclusory, unsupported, undocumented statements regarding preparation of the analysis without any of the supporting documentation in the Permit are no substitute for a defensible antidegradation analysis.

The antidegradation review process is especially important in the context of waters protected by Tier 2. See EPA, Office of Water Quality Regulations and Standards, *Water Quality Standards Handbook*, 2nd ed. Chapter 4 (2nd ed. Aug. 1994). Whenever a person proposes an activity that may degrade a water protected by Tier 2, the antidegradation regulation requires a state to: (1) determine whether the degradation is "necessary to accommodate important economic or social development in the area in which the waters are located"; (2) consider less-degrading alternatives; (3) ensure that the best available pollution control measures are used to limit degradation; and (4) guarantee that, if water quality is lowered, existing uses will be fully protected. 40 CFR § 131.12(a)(2); EPA, Office of Water Quality Regulations and Standards, Water Quality Standards Handbook, 2nd ed. 4-1, 4-7 (2nd ed. Aug. 1994). These activity-specific determinations necessarily require that each activity be considered individually.

For example, the APU 90-004 states:

> "Factors that should be considered when determining whether the discharge is necessary to accommodate social or economic development and is consistent with maximum public benefit include: a) past, present, and probably beneficial uses of the water, b) economic and social costs, tangible and intangible, of the proposed discharge compared to benefits. The economic impacts to be considered are those incurred in order to maintain existing water quality. The financial impact analysis should focus on the ability of the facility to pay for the necessary treatment. The ability to pay depends on the facility's source of funds. In addition to

> demonstrating a financial impact on the publicly – or privately – owned facility, the analysis must show a significant adverse impact on the community. The long-term and short-term socioeconomic impacts of maintaining existing water quality must be considered. Examples of social and economic parameters that could be affected are employment, housing, community services, income, tax revenues and land value. To accurately assess the impact of the proposed project, the projected baseline socioeconomic profile of the affected community without the project should be compared to the projected profile with the project…EPA's Water Quality Standards Handbook (Chapter 5) provides additional guidance in assessing financial and socioeconomic impacts"

The evaluation contains no comparative costs. As a rule-of-thumb, USEPA recommends that the cost of compliance should not be considered excessive until it consumes more than 2% of disposable household income in the region. This threshold is meant to suggest more of a floor than a ceiling when evaluating economic impact. In the Water Quality Standards Handbook, USEPA interprets the phrase "necessary to accommodate important economic or social development" with the phrase "substantial and widespread economic and social impact."

The antidegradation analysis must discuss the relative economic burden as an aggregate impact across the entire region using macroeconomics. Considering the intrinsic value of the Delta to the entire state and the potential effects upon those who rely and use Delta waters, it must also evaluate the economic and social impacts to water supply, recreation, fisheries, etc. from the Discharger's degradation of water quality in the Delta. Nor has the case been made that there is no alternative for necessary housing other than placing it where its wastewater must discharge directly into sensitive but seriously degraded waters. It is unfortunate that the agency charged with implementing the Clean Water Act has apparently decided it is more important to protect the polluter than the environment.

There is nothing in the Permit resembling an alternatives analysis evaluating less damaging and degrading alternatives. Unfortunately, the Permit fails to evaluate and discuss why there is no alternative other than discharging to surface waters. Other communities have successfully disposed of wastes without discharging additional pollutants to degraded rivers. A proper alternatives analysis would cost out various alternatives and compare each of the alternatives' impacts on beneficial uses.

There is nothing resembling an analysis buttressing the unsupported claim that BPTC is being provided. An increasing number of wastewater treatment plants around the country and state are employing reverse-osmosis (RO), or even RO-plus. Clearly, micro or nano filtration can be considered BPTC for wastewater discharges of impairing pollutants into critically sensitive ecological areas containing listed species that are already suffering serious degradation.

There is nothing in the Permit resembling an analysis that ensures that existing beneficial uses are protected. While the Permit identifies the constituents that are included on the 303(d) list as impairing receiving waters, it fails to discuss how and to what degree the identified beneficial uses will be additionally impacted by the discharge. Nor does the Permit analyze the incremental and cumulative impact of increased loading of non-impairing pollutants on beneficial uses. In fact, there is almost no information or discussion on the composition and health of the identified

beneficial uses. Any reasonably adequate antidegradation analysis must discuss the affected beneficial uses (i.e., numbers and health of the aquatic ecosystem; extent, composition and viability of agricultural production; people depending upon these waters for water supply; extent of recreational activity; etc.) and the probable effect the discharge will have on these uses.

Alternatively, Tier 1 requires that existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. By definition, any increase in the discharge of impairing pollutants to impaired waterways unreasonably degrades beneficial uses and exceeds applicable water quality standards. Prohibition of additional mass loading of impairing pollutants is a necessary stabilization precursor to any successful effort in bringing an impaired waterbody into compliance.

The State Board has clearly articulated its position on increased mass loading of impairing pollutants. In Order WQ 90-05, the Board directed the San Francisco Regional Board on the appropriate method for establishing mass-based limits that comply with state and federal antidegradation policies. That 1990 order stated "[I]n order to comply with the federal antidegradation policy, the mass loading limits should also be revised, based on mean loading, concurrently with the adoption of revised effluent limits. The [mass] limits should be calculated by multiplying the [previous year's] annual mean effluent concentration by the [four previous year's] annual average flow (Order WQ 90-05, p. 78). USEPA points out, in its 12 November 1999 objection letter to the San Francisco Regional Board concerning Tosco's Avon refinery, that '[a]ny increase in loading of a pollutant to a water body that is impaired because of that pollutant would presumably degrade water quality in violation of the applicable antidegradation policy."

Any project that allows a single new community to artificially minimize waste management costs by externalizing the disposal of wastes to already degraded waterways that are part of the common property right of all 36 million Californians has not met the test of "maximum benefit of the people of the State" and cannot be consistent with state and federal antidegradation policies. The proposed increase in pollutant mass loading will inescapably and detrimentally affect aquatic life, contribute to violations of water quality standards and increase the risks and costs to the millions of people who depend upon the Delta for their drinking/irrigation/recreation water. Any increase housing and/or economic expansion facilitated by the proposed Permit will be at the expense of other communities that will incur the consequences of larger load reductions when TMDL load allocations are instituted.

NPDES permits must include any more stringent effluent limitation necessary to implement the Regional Board Basin Plan (Water Code 13377). The Tentative Permit fails to properly implement the Basin Plan's Antidegradation Policy. The discharge must be capable of achieving 100% compliance with Effluent and Receiving Water Limitations prior to allowing the new discharge.

Thank you for considering these comments. If you have questions or require clarification, please don't hesitate to contact us.

Sincerely,

Bill Jennings, Executive Director
California Sportfishing Protection Alliance