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15 April 2010

Mr. Ken Landau, Assistant Executive Officer
Ms. Diana Messina, Supervising WRCE
Mr. Jim Marshall, Sr. WRCE
Ms. Elizabeth Lee, 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. CA0083771) for City of Rio Vista, Northwest Wastewater Treatment Plant, Solano County

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

The California Sportfishing Protection Alliance (CSPA) has reviewed the proposed Waste Discharge Requirements in the above referenced matter and respectfully 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 Solano County.

1. The proposed Permit fails to utilize valid, reliable, and representative effluent data in conducting a reasonable potential and limits derivation calculations contrary to the SIP and US EPA's interpretation of Federal Regulations, 40 CFR 122.44(d), and should not be adopted in accordance with 40 CFR 122.4 (a), (d) and (g) and CWC Section 13377.

The proposed Permit, page F-22 b. RPA Dataset, states that: **"**Data used for the RPA came from the Discharger's self monitoring reports from August 2006 to January 2009 and the Discharger's most recent SIP sampling, which was conducted in January, June, September, and December 2002. The 18 December 2002 receiving water data was excluded from the RPA dataset, because it was collected during a significant storm event. Section 1.4.3.1 of the SIP states that "the

RWQCB shall have discretion to consider if any samples are invalid for use as applicable data due to evidence that the sample has been erroneously reported or the samples is not representative of the ambient receiving water column that will mix with the discharge. For example, the RWQCB shall have discretion to consider samples to be invalid that have been taken during peak flows of significant storm events." The 18 December 2002 receiving water-sampling event included elevated concentrations for several metals, which is an indication of high sediment load in the river that occurs during storm events. According to Department of Water Resources flow data, the Sacramento River was flowing at 48,465 cubic feet per second (cfs) on 18 December 2002 at the Freeport Bridge. Precipitation data from Sacramento County Department of Water Resources indicates that from 13 December 2002 to 15 December 2002, an accumulated rainfall amount of 8.19 inches was measured in Sacramento County (at Morrison Creek on Mack Road). The Sacramento River flows were approximately 10,000 cfs prior to this storm event. This information indicates that the 18 December 2002 sample was collected during a significant storm event. Therefore, in accordance with the SIP, the Regional Water Board finds that the data is invalid."

Statistical procedures are valid tools for assessing trends and analyzing data. It must be recognized however that statistical procedures are not scientific laws. In wastewater engineering it is commonplace for individual data points to be peaks or depressions far from the statistical norm. This is could be attributed to slug load discharges, discharge practices from local industries, or simply the infrequency of sampling wastewater effluents. Wastewater effluent is generally not sampled continuously. It must also be recognized that wastewater treatment personnel tend to perform their daily functions as a matter of routine, such as sampling the effluent at the same time every day. The likely hood of data peaks being "real" absent erroneously reporting, questionable quality control/quality assurance practices or varying seasonal or daily conditions is more defensible than the data being an "outlier", hence the EPA and SIP requirement that data may not be arbitrarily discarded or ignored. In this case the Regional Board in discarding data cites that: "The 18 December 2002 receiving water sampling event included elevated concentrations for several metals, which is an indication of high sediment load in the river that occurs during storm events." The proposed Permit does not cite the specific metals or the measured concentrations. The Regional Board is likely correct that there was a high sediment load in the receiving stream during the cited storm event. The Regional Board does not mention that this period would also represent numerous other wet weather sources of high pollutants such as mine drainage, storm water and sewer system overflows. Upstream mines in this watershed are well documented to contain significantly higher metal concentrations during storm events, which result in overflows from the mine site. Storm water has routinely been shown to contain toxic constituents particularly during periods of first flush. There are numerous stormwater outfalls upstream of the City's discharge. The Regional Board permits the discharge of partially treated domestic sewage, which may contain high levels of toxic pollutants, including metals, from the upstream City of Sacramento's combined sewer system. The Regional Board also does not explain that the transport and mixing of sediment releases toxic constituents contained in the sediments. The Regional Board should have viewed this data point as particularly valuable in assessing potential toxicity and as a worst-case data point rather than simply discarding it. The allowance for a mixing zone, absent this data representative of the assimilative capacity, cannot be accurate or protective of the beneficial uses of the receiving stream. The Regional Board is required to protect the beneficial uses of the

receiving stream during all periods of the five-year life of the NPDES permit, not just during nice weather. It is particularly critical to assess the impacts of the City's wastewater discharge during critical periods. The Regional Board's discarding of this data is not defended by a single argument or technical authority that would support that the data is not only representative of the discharge but is essential and critical in writing a permit that is protective of water quality and the beneficial uses of the receiving stream. The permit must be redrafted based on the "elevated concentrations for several metals"

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 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 Regional Board has failed to use valid, reliable and representative data in developing limitations, contrary to the cited Federal Regulation.

The *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries Of California* (SIP), Section 1.2 requires that: "When implementing the provisions of this Policy, the RWQCB shall use all available, valid, relevant, representative data and information, as determined by the RWQCB. The RWQCB shall have discretion to consider if any data are inappropriate or insufficient for use in implementing this Policy. Instances where such consideration is warranted include, but are not limited to, the following: evidence that a sample has been erroneously reported or is not representative of effluent or ambient receiving water quality; questionable quality control/quality assurance practices; and varying seasonal conditions."

Federal Regulation, 40 CFR 122.4 (a), (d) and (g) require that no permit may be issued when the conditions of the permit do not provide for compliance with the applicable requirements of the CWA, or regulations promulgated under the CWA, when imposition of conditions cannot ensure compliance with applicable water quality requirements and for any discharge inconsistent with a plan or plan amendment approved under Section 208(b) of the CWA. In accordance with 40 CFR 122.4 (a), (d) and (g) the proposed Permit may not be adopted for failing to include protective limitations based on valid, reliable and representative data.

California Water Code, section 13377, requires that: "Notwithstanding any other provision of this division, the state board and the regional boards shall, as required or authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

The State Board's Davis Order, *WQ 2008-0008 Corrected*, states in part on page 11 that: "There remains the issue of whether 190 mg/l and 250 mg/l were the appropriate hardness values to use in determining reasonable potential and calculating effluent limitations. Available data show actual hardness values lower than 190 mg/l at Willow Slough Bypass and lower than 250 mg/l at Conaway Ranch Toe Drain. Though all of these values were influenced by storm events, those daily samples were are still representative of actual conditions of the receiving water and require protection from toxicity impacts. Acute toxicity criteria are expressed as short-term exposure concentrations to prevent or minimize impacts from spikes that can occur over short periods of time. Therefore, the low-flow hardness values of 190 mg/l at Willows Slough Bypass and 250 mg/l at Conaway Ranch Toe drain are not protective for acute toxicity impacts during times of storm events." While this citation discusses hardness, the issue of protecting the receiving stream is still relevant since it address protecting the receiving stream during storm events and worst-case events. This concept is also repeated in the Davis Order in the "It is hereby ordered that" section on the final pages of the Order.

The proposed Permit is not based on all of the available valid, reliable and representative data. To the contrary, the most critical data point, containing elevated concentrations of several metals was inappropriately discarded. Absent a reasonable potential analysis and development of permit limitations based on this data the proposed Permit cannot contain effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance. The proposed Permit must be redrafted and recirculated for public comment.

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

The proposed Permit, page F-16, states that: "The effluent hardness ranged from 100 mg/L to 130 mg/L (as CaCO3), based on eight samples from October 2006 to October 2008. There is minimal hardness data for the upstream receiving water in the vicinity of the discharge. The Sacramento River hardness at Rio Vista varied from 58 mg/L to 94 mg/L (as CaCO3), based on three samples from January 2002 to September 2002. Since there are only three hardness samples for the Sacramento River at Rio Vista, Sacramento River hardness data at Hood, which is 27.5 miles upstream of Rio Vista, was also evaluated using the Department of Water Resources' California Data Exchange Center (CDEC) database. The CDEC Sacramento River hardness at Hood ranged from 35 mg/L to 110 mg/L (as CaCO3), based on 420 samples from August 1997 to February 2010. As shown in Attachment J, Figure F-1, the river hardness varies with the flow. During higher flows the hardness is lowest, while at critical low flows the range of hardness is higher. Since high flows in the river do not represent the critical receiving water flows, the hardness during lower flows were evaluated to determine the hardness under design low flow conditions as required by the CTR."

The proposed Permit, page F-17, states that: "When the effluent and receiving water are at their respective minimum observed hardness values (i.e. 100 mg/L and 50 mg/L as CaCO3,

respectively), and the effluent fraction is 4.8%, the mixed hardness can be estimated as 52 mg/L (as CaCO3) using a simple mass balance to represent the downstream ambient hardness. However, the effluent hardness dataset is not sufficiently robust to ensure the minimum observed effluent hardness represents expected low hardness of the effluent. Therefore, the minimum upstream receiving water hardness of 50 mg/L as CaCO3 has been used to calculate the CTR metals criteria for this Order. Should the Discharger collect additional effluent hardness data to support the use of a downstream mixed hardness, this Order may be reopened to adjust the CTR criteria for the hardness dependent metals."

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 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. Confirming this definition, the SIP Sections 1.4.3.1 *Ambient Background Concentration as an Observed Maximum* and 1.4.3.2 state in part that: "If possible, preference should be given to ambient water column concentrations measured immediately upstream or near the discharge, but not within an allowed mixing zone for the discharge. The RWQCB shall have discretion to consider if any samples are invalid for use as applicable data due to evidence that the sample has been erroneously reported or the sample is not representative of the ambient receiving water column that will mix with the discharge."

The Regional Board has used the effluent hardness and the instream effluent hardness measured immediately downstream of the point of discharge, calling such "ambient". Ambient is defined as "surrounding;" not "in the middle of". Regional Board staff has begun to define any hardness used (effluent, upstream and downstream) as being "ambient". 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.

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. 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 true ambient (upstream) receiving water hardness is more restrictive.

The Regional Board's use of hardnesses other than the upstream is based on an approach developed by Dr. Robert Emerick, of Eco:Logic Engineers. Dr. Emerick developed a different

approach for evaluating hardness-dependent metals that used effluent and downstream hardness values in assessing reasonable potential and developing effluent limits. He subsequently presented his approach at the Water Board's Training Academy and the Regional Board has adopted this methodology as a defacto policy in developing and issuing wastewater discharge permits. Dr. Emerick's approach has never been evaluated or adopted through the legally mandated rule-making procedures. Use of the policy has resulted in fewer and less stringent and less protective limits in numerous permits.

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).

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 "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 in 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.

SWRCB prescidential Order No. WQ 2008-0008 (Corrected) regarding a petition for consideration of the City of Davis' NPDES Permit states and concludes that:

"Based on the current record, it would be more appropriate to use the lowest reliable upstream receiving water hardness values of 78 mg/l for Willows Slough Bypass and 85 mg/l for Conaway Ranch Toe Drain for protection from acute toxicity impacts, regardless of when the samples were taken or whether they were influenced by storm events. Because high flow conditions may deviate from the design flow conditions for selection of hardness as specified in the CTR, it may not be necessary, in some circumstances, to select the lowest hardness values from high flow or storm event conditions. Regardless of the hardness used, the resulting limits must always be protective of water quality criteria under all flow conditions."

"Conclusion: The Central Valley Water Board was justified in using upstream receiving water hardness values rather than effluent hardness values. However, for protection from acute toxicity impacts in the receiving waters, which can occur in short durations even during storm events, in this case, based on the existing record, the Central Valley Water Board should have used the lowest valid upstream receiving water hardness values of 78 mg/l for Willow Slough Bypass and 85 mg/l for Conaway Ranch Toe Drain. Effluent limitations must protect beneficial uses considering reasonable, worst-case conditions. We recognize that this approach does not necessarily agree with conclusions in other guidance stating that low flow conditions are the "worst-case" conditions. However, nothing in this Order is intended to suggest that low flows are inappropriate for determining the reasonable, worst-case conditions in other contexts." (Emphasis added)

The Regional Board cited the State Board's Water Quality Order (WQO)(No. 2008 0008) for the City of Davis as allowing complete discretion in utilizing the downstream hardness in deriving limits for toxic metals. WQO 2008 0008 in requiring the Regional Board to modify their permit states: "Revise the Fact Sheet to include a discussion of the appropriate hardness to use to protect from acute toxicity impacts (which can occur in short-term periods including storm events) in the receiving waters. The Fact Sheet should also state that the lowest valid upstream receiving water hardness values of 78 mg/l for Willow Slough Bypass and 85 mg/l for Conaway Ranch Toe Drain should be used to determine reasonable potential for the effluent to exceed the hardness-dependent metal CTR criteria, unless additional evidence and analysis, consistent with this Order, demonstrates that different hardness values are appropriate to use and are fully protective of water quality." The Regional Board did not use the lowest observed upstream hardness as required in WQO 2008 0008. The Regional Board has not provided additional evidence and analysis demonstrating that different hardness is fully protective of beneficial uses. To the contrary, the Regional Board does not address the March 24, 2000 the US Fish and Wildlife

Service (Service) and the National Marine Fisheries Service (NMFS) CTR Biological Opinion cited above stating that the use of hardness alone is not protective of beneficial uses and recommending the sole use of the ambient upstream hardness in developing limits for toxic metals.

The proposed Permit imposes the exact opposite as is required by the State Board in the Davis Order. The proposed Permit explains that the cases are different than the Davis case since a mixing zone is allowed at Rio Vista. However, there is no evidence in the proposed Permit that the mixing zone was based or calculated on metals utilizing a higher hardness. It must also be recalled from the first comment above that high metals concentrations were thrown out and not used in developing the permit as the Regional Board believed the values collected during periods of high receiving water flow were not representative. Compounding the absence of elevated metals concentrations and the unknown parameters of a mixing zone with utilization of an elevated hardness can only lead to the conclusion that the permit is not protective of the aquatic life beneficial uses of the receiving stream.

The Regional Board's arguments with regard to effluent and/or downstream receiving water hardness 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 and mixed hardness to conduct a reasonable potential analysis uses the allowance of a mixing zone prior to conducting the reasonable potential analysis, which is inappropriate and unprotective of the receiving water aquatic life beneficial use.

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. Failure to utilize the upstream ambient hardness for determining reasonable potential and developing limitations results in fewer and less restrictive Effluent Limitations.

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

"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 that 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:

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

The proposed Permit's mixing zone discussion does not include sufficient detail to conclude that a single required item in the SIP has been complied with.

Federal regulation 40 CFR Section 131.12 (a)(1) the Antidegradation Policy requires that: "Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." The Central Valley Regional Board routinely grants mixing zones above the drinking water maximum contaminant level (MCL) for human health criteria despite that municipal and domestic supply is a designated beneficial use of the receiving stream. The designated beneficial use of drinking water is not protected within the reach of the stream, which is often established as some unknown length, contrary to 40 CFR 131.12.

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.

The mixing zone is based on the CORMIX model. CORMIX is not a dynamic model and is not capable of analyzing the estimated 13 flow reversals due to tidal influences (page F-20). The modeler is stated to have used a conservative approach in using CORMIX to account for the flow reversals that "an effluent concentration of 1.3 percent was, therefore, added to the results obtained from the CORMIX model for assessment of diffuser effectiveness." There is nothing to support that the Consultants "conservative" approach makes a static model acceptable for dynamic flow conditions. The mixing zone was approved and implemented under the last NPDES permit. NPDES permits have a five-year life. There was apparently no effort undertaken in the five-year period to conduct sampling that would confirm the modeling assumptions. The proposed Permit states (page F-21) that there is no acute toxicity allowed in the mixing zone and that this is achieved by conducting toxicity tests. The TSD details several acceptable methods for determining toxicity within mixing zones; there is no evidence that any of the scientific methods detailed in the TSD for preventing acute toxicity was utilized in allowing a mixing zone. As is detailed in the first comment above, the Regional Board has discarded elevated concentrations for several unidentified metals based on high river flows; this information would have been critical in determining if any assimilative capacity exists for mixing. Absent the metals data, the mixing zone determination cannot be legitimized.

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

The maximum effluent concentration (MEC) for aluminum was 100 ug/L, based on ten samples collected between October 2006 and December 2008, while the maximum observed upstream receiving water concentration was 800 ug/L, based on three samples collected between January 2002 and October 2002.

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.

Aluminum in the effluent has been measured as high as 100 µg/l. Freshwater Aquatic habitat is a beneficial use of the receiving stream. The receiving stream has been measured to contain aluminum concentrations as high as 800 ug/l, but it must be remembered that the Regional Board has discarded high metals values that were collected during a period of high flow.

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.

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.

The drinking water maximum contaminant level (MCL), which is included as a Basin Plan Water Quality Chemical Constituents Objective, for aluminum is 1,000 as a primary MCL and 200 µg/l as a secondary MCL.

Based on information included in analytical laboratory reports submitted by the Discharger, aluminum in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a level necessary to protect aquatic life, and, therefore to violate the Basin Plan's narrative toxicity objective.

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.

The proposed Permit, page F-54, states that: "The effluent limitations for aluminum in this Order are less stringent than the effluent limitations required in Order No. R5-2004-0092. The

previous permit contained monthly average and maximum daily effluent limitations for aluminum of 71 ug/L and 142 ug/L, respectively. These effluent limitations were established based on the NAWQC for protection of freshwater aquatic life to interpret the Basin Plan's narrative toxicity objective. However, upon evaluation of site-specific conditions of the Sacramento River (see Section IV.C.3.e.i of this Fact Sheet for discussion) the Regional Water Board has determined that the chronic aquatic life criterion for aluminum is not applicable, which results in less stringent effluent limits. The effluent aluminum concentrations are less than the receiving water concentrations, therefore, the relaxation of the aluminum effluent limitations is not an antidegradation issue. Therefore, the relaxation of the aluminum effluent limitations is consistent with antidegradation requirements." The Regional Board staff has not consulted Water Quality Standards experts in their discarding of EPA's recommended criteria. Site-specific limitations for aluminum have not been pursued by the Regional Board for aluminum if they believe the recommended criteria are incorrect.

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

Federal Regulation 40 CFR 122.45 (d)(2) requires that permit for POTWs establish Effluent Limitations as average weekly and average monthly unless impracticable. The proposed Permit establishes Effluent Limitations for EC and aluminum as an annual average contrary to the cited Federal Regulation. Establishing the Effluent Limitations for EC and aluminum in accordance with the Federal Regulation is not impracticable, to the contrary the Central Valley Regional Board has a long history of having done so. Proof of impracticability is properly a steep slope and the Regional Board has not presented any evidence that properly and legally limiting EC, and aluminum is impracticable.

Limiting these constituents to be regulated on an annual, average will allow for peaks well above the secondary MCLs directly impacting the numerous documented downstream domestic water users. There does not appear to be any reasoning or logic applied to the Regional Board staff's attempts to relax water quality objectives contrary to Federal Regulations. The permit must be amended to limit EC and aluminum in accordance with the cited Federal Regulation.

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