

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD
ORDER WQO 2004-0010

In the Matter of the Own Motion Review of

CITY OF WOODLAND

Waste Discharge Requirements Order No. R5-2003-0031 [NPDES No. CA0077950]
and Cease and Desist Order No. R5-2003-0032
Issued by the
California Regional Water Quality Control Board,
Central Valley Region

SWRCB/OCC FILE A-1561

BY THE BOARD:

The City of Woodland (Woodland) petitioned¹ the State Water Resources Control Board (State Board or Board) in April 2003 to review waste discharge requirements and a cease and desist order for Woodland's wastewater treatment plant. The Central Valley Regional Water Quality Control Board (Regional Board) issued the requirements and order to Woodland in March 2003. In this order the State Board reviews and revises the requirements and order on the Board's own motion.²

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¹ Woodland filed its original petition on April 14, 2003. By letter dated May 23, 2003, the Board advised Woodland that its petition was complete. The Board also granted Woodland's request to file supplemental points and authorities within 20 days after the Regional Board filed the administrative record for the permit. Woodland was advised that the Board would not accept replies to petition responses. After three time extensions, Woodland filed a supplemental petition and a reply on August 13, 2003, the due date for supplemental points and authorities. One month later, Woodland filed supplemental points and authorities. The Board is reviewing Woodland's waste discharge requirements and cease and desist order on its own motion. In this review, the Board considers certain issues raised in Woodland's original petition and supplemental petition, dated August 13. The August reply and September supplemental points and authorities, which were untimely, are excluded from the Board's record.

² See Wat. Code § 13320(a); Cal. Code Regs., tit. 23, § 2050.5(c). In this review, the Board is considering only those issues deemed substantial. Cf. Cal. Code Regs., tit. 23, § 2052(a)(1).

I. BACKGROUND

Woodland owns and operates a secondary wastewater treatment plant, called the Water Pollution Control Facility. The treatment system includes three activated sludge oxidation ditches, three secondary clarifiers, and chlorination and dechlorination facilities. In addition, Woodland uses over 300 acres of ponds for sludge treatment and to equalize peak wet weather flows. The facility treats 6.03 million gallons per day (mgd) of domestic, industrial, and commercial wastewater on an average daily basis. Woodland is currently expanding the treatment plant's design flow from 7.8 mgd to 10.4 mgd.

Treated effluent is discharged to Tule Canal in the Yolo Bypass. The Yolo Bypass is a floodway that receives overflow from the Sacramento River. The Tule Canal is situated entirely within the Yolo Bypass, along its eastern edge. The canal was originally known as the Tule Drain.³ The Tule Drain was a natural waterway that meandered through the Sacramento Valley. When the levees for the Yolo Bypass were constructed, however, the Tule Drain's natural flows were cut off, and the Tule Canal came into existence. The Tule Canal is a low-flow channel that was formed in a former borrow pit associated with construction of the flood levees for the Yolo Bypass.

Tule Canal experiences extreme seasonal variations in flow and channel geometry.⁴ Dry season flows are often too low to be measured. Conversely, wet season flows can be extreme, exceeding 300,000 cubic feet per second, spreading across the nearly mile-wide Yolo Bypass.

The water quality control plan (Basin Plan) for the Sacramento and San Joaquin River Basins designates beneficial uses for the Yolo Bypass.⁵ These uses include, among others, body-contact recreation (REC-1), non-contact water recreation (REC-2), warm freshwater habitat (WARM), cold freshwater habitat (COLD), and agricultural supply (AGR). Because Tule Canal is contained within the Yolo Bypass, beneficial use designations for the bypass also apply to the canal.

³ Regional Board Administrative Record (AR), Binder 13, Item 93, "Recreation, Land Use, and Dilution Study of the Tule Canal and Toe Drain," Woodland (Dec. 2000) (Woodland Recreation Study) at 2-1.

⁴ AR, Binder 6, Item 50, "Report of Waste Discharge for the City of Woodland Water Pollution Control Facility," (July 2000), "City of Woodland 2001 Tule Canal Study Report" (Woodland Tule Canal Study) at 51.

⁵ Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Central Valley Region, Sacramento River Basin and San Joaquin River Basin (3d ed. 1994), Table II-1, Surface Water Body 52.

In March 2003, the Regional Board reissued waste discharge requirements in Order R5-2003-0031 to regulate Woodland's effluent discharge to the Tule Canal. The requirements also serve as a National Pollutant Discharge Elimination System (NPDES) permit under the Clean Water Act.⁶ The Regional Board concurrently issued Cease and Desist Order R5-2003-0032 to Woodland because the Regional Board determined that Woodland could not consistently comply with several permit limits.

The 2003 permit replaces Woodland's 1998 permit. Prior to issuing the 1998 permit, Regional Board staff recommended that the permit require that Woodland achieve tertiary treatment in order to protect Tule Canal's REC-1 and AGR uses. The permit was ultimately modified to allow Woodland to do a site-specific study to assess recreational usage, the types of crops irrigated with canal water, and the dilution of Woodland's discharge. Woodland submitted the completed study to the Regional Board in December 2000.⁷ Regional Board staff concluded that the study clearly demonstrated the need for disinfection. They informed Woodland in November 2001 that they anticipated recommending tertiary treatment for the next permit renewal.

Likewise, in early 1999 Regional Board staff notified Woodland that high salt concentrations in its effluent could impair Tule Canal's AGR uses. The Regional Board repeated this concern in 2001 and 2002. Woodland originally responded that the city would investigate salinity sources and evaluate efforts to reduce salt loadings. However, beginning in 2002 Woodland asserted that the high salt concentrations in effluent discharged from the treatment plant were due to high salt levels in its water supply.

Not surprisingly, the Regional Board reissued Woodland's permit in 2003 with new requirements to achieve tertiary treatment and an effluent limit for electrical conductivity (EC), a measure of water salinity. The 2003 permit also added effluent limits for several new pollutants, including dibromochloromethane, iron, aluminum, and ammonia.

Woodland contends that the new tertiary treatment and EC requirements are unlawful and excessively costly. In its petition Woodland also raises numerous other legal

⁶ 33 U.S.C. § 1251 et seq.; see *id.* § 1342. Under the Clean Water Act, a pollutant discharge from a point source, such as a pipe, is prohibited unless regulated under a NPDES permit. The permits are issued by the United States Environmental Protection Agency (EPA) or by states with approved permit programs. California has an approved program.

⁷ See fn. 3, *supra*.

challenges to the permit and cease and desist order. Woodland asks the State Board to vacate and remand the permit and cease and desist order to the Regional Board.

II. CONTENTIONS AND FINDINGS

Contention: Woodland contends that the Regional Board improperly imposed the EC limit, 700 micromhos per centimeter ($\mu\text{mhos/cm}$).⁸ Woodland contends that the limit is unnecessary to protect Tule Canal's beneficial uses. Woodland also argues that the Regional Board misapplied guidelines in a United Nations report⁹ (UN Report) in developing the limit.

Finding: High EC in irrigation water can damage crops by impairing water uptake. Where effluent EC levels can cause or contribute to a violation of water quality standards for AGR, a permit limit for EC is required. To assess whether effluent EC levels can cause or contribute to a narrative objective violation, the Regional Board must select an appropriate numeric value to implement the narrative objective. Appropriate EC values are influenced by site-specific factors, such as significant flooding. This order revises the Woodland permit to require Woodland to study its discharge's impacts on soil salinity and to propose an appropriate EC value based on site-specific conditions. Woodland must concurrently develop a salinity source control plan. Pending the timely completion of the study and source control plan, a permit limit for EC is premature. This order includes a time schedule for Woodland to complete the study and plan. After they are completed, the Regional Board must reevaluate whether EC levels in Woodland's effluent can cause or contribute to violation of the narrative objective and, if so, reopen the permit to include an appropriate limit.

Woodland has quantified EC levels in its effluent as high as 2700 $\mu\text{mhos/cm}$ with an average of 1578 $\mu\text{mhos/cm}$.¹⁰ Woodland's effluent discharge consistently causes significant increases in downstream EC concentrations in Tule Canal. While upstream EC levels from May through October ranged from 470 to 740 $\mu\text{mhos/cm}$, EC levels downstream from the discharge point ranged from 770 to 1000 $\mu\text{mhos/cm}$.

⁸ Order No. R5-2003-0031, Finding 9(m), Effluent Limitation B.1.

⁹ See "Water Quality for Agriculture" by Ayers and Westcot, Food and Agriculture Organization of the United Nations (1985), AR, Binder 4, Item 27, Document 5 of Woodland Comments on January 9, 2003, Vol. II.

¹⁰ See Order No. R5-2003-0031, Finding 3.

The Regional Board established an EC permit limit of 700 $\mu\text{mhos/cm}$ as a six-month average. The cease and desist order requires that Woodland fully comply with this limit by March 30, 2008.¹¹ The Regional Board did not impose an interim EC limit.

In general, the Clean Water Act requires that permits include effluent limits for all pollutants that can be discharged at levels that can cause or contribute to a violation of water quality standards.¹² Water quality standards include a water's beneficial uses and criteria to protect the uses.¹³ Criteria, which are synonymous with the term "water quality objectives" under state law,¹⁴ can be either narrative or numeric.¹⁵

The Regional Board implemented a narrative water quality objective for chemical constituents when it adopted the EC permit limit. The objective states that waste "shall not contain chemical constituents in concentrations that adversely affect beneficial uses."¹⁶ The Regional Board followed its Basin Plan "Policy for Application of Water Quality Objectives" in developing the limit.¹⁷ The policy provides, in part, that the Regional Board will consider relevant numerical criteria and guidelines developed by other organizations in implementing narrative objectives. The Regional Board based the EC permit limit on numeric values in the UN Report.

According to the report, as irrigation water's total salt content increases, various soil and cropping problems develop, and special management practices may be required to maintain acceptable crop yields.¹⁸ When crops are irrigated, salts present in the irrigation water are applied with the water and remain behind in the soil as the water either evaporates or is taken up by the crop. Yield reductions occur when salts have accumulated in the crop root zone to such an extent that the crop can no longer extract sufficient water from the salty soil solution. Site-specific factors, such as soil, climate, and crop selection, can affect the extent to which problems develop, however. Whether irrigation water is suitable will depend on the conditions

¹¹ Cease and Desist Order No. R5-2003-0032, Directive 2.

¹² 33 U.S.C. § 1311(b)(1)(C); 40 C.F.R. § 122.44(d). See also Wat. Code § 13377.

¹³ 33 U.S.C. § 1313(c). Water quality standards also include an antidegradation policy. See 40 C.F.R. § 131.6.

¹⁴ Compare 40 C.F.R. § 131.3(b) with Wat. Code § 13050(h).

¹⁵ 40 C.F.R. § 131.3(b).

¹⁶ Basin Plan at III-3.00.

¹⁷ *Id.* at IV-18.00.

¹⁸ See fn. 9, *supra*.

under which it is used, which affect salt accumulation and, hence, crop yield. The UN Report indicates that no soil or cropping problems are ordinarily encountered when EC levels in irrigation water are less than 700 $\mu\text{mhos/cm}$. As EC levels rise, farmers must exercise increasing care in selecting crops and management alternatives in order to achieve full yield potential.

Woodland argues that the EC limit is unnecessary because salt-sensitive crops are generally not grown nor probably will be grown in the future in the Yolo Bypass. The Yolo Bypass, which includes Tule Canal, is designated for AGR as an existing use. It is undisputed that canal waters are actually used for agricultural irrigation. The designated use, AGR, is not restricted to salt-tolerant crops.¹⁹ Nor is there anything in the record to indicate that soil conditions, climate, or other factors, preclude growing salt-sensitive crops. Salt-sensitive crops include, for example, strawberries and beans. Flooding in the Yolo Bypass does affect crop selection. There is some indication that perennial crops that do not tolerate persistent flooding, such as strawberries, are not appropriate for the Yolo Bypass. However, there is no credible evidence to indicate that other salt-sensitive crops, such as beans, could not be grown there. Upstream EC concentrations in Tule Canal are generally suitable for all crops.

Woodland contends that, in any event, the UN Report does not state that waters with EC levels at 700 $\mu\text{mhos/cm}$ or higher are unsuitable for agricultural irrigation. Rather, the report indicates that use restrictions on irrigation water may be necessary as EC levels rise. Restrictions can range from slight to moderate for irrigation waters with EC levels between 700 and 3000 $\mu\text{mhos/cm}$ and can be severe for irrigation waters with levels over 3000 $\mu\text{mhos/cm}$. The report describes options that irrigators may choose to compensate for elevated salinity in their supply water, such as adding more water to leach salts, changing crops, or adding drainage.

While these options may be necessary in some cases, it is inappropriate to force downstream irrigators to alter their practices and incur costs to accommodate a controllable upstream discharge. This would essentially allow a water quality impairment to continue unabated with the costs passed on to downstream users. This approach is inconsistent with the Regional Board's responsibility to protect the AGR use.²⁰

Woodland contends that the Regional Board, nonetheless, improperly applied the 700 $\mu\text{mhos/cm}$ limit to its discharge because the Regional Board failed to consider site-specific

¹⁹ See Basin Plan at II-1.00.

²⁰ See 33 U.S.C. § 1311(c)(2)(B); 40 C.F.R. § 122.44(d); Wat. Code § 13377.

factors that affect salt accumulation. In particular, Woodland cites the periodic flooding in the Yolo Bypass.

Woodland's contention has merit. The Regional Board's policy on applying narrative objectives explains that the Regional Board evaluates whether the specific numerical values, including UN guidelines, "are relevant and appropriate to the situation at hand." Applying the 700 $\mu\text{mhos/cm}$ EC value, without further study, appears to be inappropriate in this case. The UN Report makes it clear that site-specific considerations are important in assessing irrigation water suitability. The preface to the report states that the guidelines can indicate potential problems and use restrictions with a water supply. However, "the true suitability of a given water depends on the specific conditions of use and on the management capability of the user."²¹ The guidelines are intended to place in perspective "water quality effects . . . with the other factors affecting crop production, the ultimate goal being to obtain maximum production per unit of available water."²²

With this caveat in mind, it is obvious that the 700 $\mu\text{mhos/cm}$ EC value cannot be interpreted as an absolute value. Rather, the Regional Board must determine whether site-specific conditions applicable to Woodland's discharge allow some relaxation in this value. Chief among them is leaching. Salinity can be managed, either by applying more irrigation water or relying on natural processes, such as rainfall, to prevent adverse crop impacts. The Board has already concluded that it is inappropriate to force downstream irrigators to accommodate a controllable upstream point source discharge by changing their irrigation practices.

As stated previously, the Tule Canal lies within the Yolo Bypass. Irrigators using water from the canal grow crops within the bypass. Evidence in the record indicates that significant flooding occurs in the Yolo Bypass in about six out of every ten years. It is reasonable to expect that significant flooding could leach sufficient salts to prevent diminished crop yields. A study is needed to test this assumption. This order revises the permit to require Woodland to conduct a study of appropriate salinity requirements for areas irrigated with Tule Canal waters diverted downstream from Woodland's discharge. The study must evaluate the soil chemistry, climate, rain and flood-induced leaching, and background water quality for the

²¹ See fn. 9, *supra*.

²² *Ibid.*

affected area and their impact on irrigation salinity requirements. Based on a site-specific assessment of these factors, the study must propose an EC level that fully protects Tule Canal's AGR use.

In addition, Woodland must concurrently develop a salinity control plan. Under its permit provisions, Woodland is required to use the best practicable treatment or control technique to limit mineralization to no more than a reasonable increment.²³ Woodland has, to date, failed to demonstrate compliance with this requirement. The Regional Board notified Woodland on three occasions, twice through notices of violation, that effluent salinity concentrations were excessively high. Until 2002, Woodland promised to assess and control salinity sources. There is no evidence in the record demonstrating that this was ever done. A source control study is warranted.

Pending the timely completion of the study and salinity control plan, the Board concludes that it is premature to include an EC limit in Woodland's current permit. It is appropriate to await the outcome of the study and plan because there is no evidence in the record before the Board that EC levels in Tule Canal waters have impaired agricultural irrigation, to date. In addition, the UN report advises consideration of site-specific conditions in evaluating EC requirements. This evaluation is needed in order for the Regional Board to determine whether effluent EC levels can cause or contribute to a violation of the chemical constituents narrative objective and to develop an appropriate effluent limit. This order revises the permit to include a time schedule for Woodland to complete the study and plan. Once the Regional Board determines an appropriate EC value, the Regional Board must reevaluate whether effluent EC levels have the reasonable potential to cause or contribute to a water quality standards exceedance. If so, the Regional Board must reopen the permit to include an appropriate limit.

Woodland has requested that the Board add boron and fluoride to this order's discussion of EC. In a footnote in its petition, Woodland objected to boron and fluoride limits in its permit on the ground that they are based on agricultural goals that were not properly adopted as water quality objectives. Woodland did not challenge the technical validity of the goals nor allege any facts indicating that the limits were improper. Although Woodland failed to properly challenge the limits, the Regional Board has acceded to Woodland's request that the EC study

²³ Order No. R5-2003-0031, Provision G.10.

include boron and fluoride. This order, therefore, revises the permit and cease and desist order accordingly.

Contention: Woodland objects to tertiary treatment requirements in its permit on the grounds that: (1) the Regional Board violated Water Code section 13360 by specifying the manner of compliance; (2) the requirements are unnecessary because Woodland's effluent already achieves tertiary quality; (3) the requirements are illegally based on Department of Health Services (Department) reclamation criteria; (4) tertiary quality effluent will not benefit Tule Canal's REC-1 or AGR uses because the receiving water's bacteriological quality is poor.

Finding: The Regional Board properly exercised its discretion when it required Woodland to meet tertiary treatment requirements. The requirements are not invalid for the reasons cited by Woodland. Year-round tertiary treatment, however, may be unnecessary. This order revises the permit to require tertiary treatment when Woodland's effluent receives less than 20:1 dilution and to grant Woodland an additional year to complete tertiary facilities.

Tule Canal waters are beneficially used for contact recreation and agricultural irrigation. Numerous irrigators hold water rights for the canal and use canal waters on their crops. Swimming and fishing also occur. During portions of the year, Tule Canal's flow rate is very small.

The Regional Board determined that Woodland's effluent must be treated to tertiary quality based on Tule Canal's REC-1 and AGR uses, the lack of consistent dilution in the receiving waters, and the Department's recommendations for public health protection. Tertiary treatment is a treatment level beyond primary and secondary treatment. Tertiary treatment typically involves adding coagulation and filtration to a secondary treatment process. Other processes may also be used to achieve tertiary quality. The purpose of tertiary treatment is to ensure that effluent is adequately disinfected and treated to prevent disease caused by pathogens.²⁴ The Regional Board found that tertiary treatment can effectively reduce viruses and parasites in wastewater and make disinfection more effective by reducing solids in the waste stream.²⁵

²⁴ See discussion in State Board Order WQ 80-19, pp. at 15-18.

²⁵ See *ibid.*

To implement the new disinfection requirements, the Regional Board included new final total coliform limits,²⁶ as well as final limits for turbidity.²⁷ The Regional Board intended the turbidity limits to serve as surrogate endpoints that can be measured more rapidly than bacterial indicators. The permit also includes new final limits for biochemical oxygen demand (BOD) and total suspended solids (TSS), which are technically based on the levels achievable with tertiary treatment.²⁸ The Regional Board included a two-year schedule ending April 30, 2005, in the permit to give Woodland time to comply with the new requirements. The permit also includes interim limits for these pollutants.

The Regional Board did not violate Water Code section 13360²⁹ by illegally specifying the manner of compliance. The permit does not prescribe any particular treatment method or technology. Rather, it requires that the discharge comply with the prescribed effluent limits, according to a time schedule, and that the effluent receive tertiary treatment, “or equivalent” that meets the effluent limits.³⁰

Woodland’s effluent does not already comply with tertiary treatment-related limits. Data from Woodland’s Report of Waste Discharge indicates that the daily maximum total coliform level was 170 MPN/100 ml while the corresponding tertiary treatment-related limit is 23 MPN/100 ml. Similarly, the daily maximum BOD and TSS levels exceeded corresponding tertiary treatment-related limits.

The Regional Board did not illegally apply the Department’s reclamation criteria, found in Title 22 of the California Code of Regulations, to Woodland’s discharge.³¹ The permit recognizes that the criteria govern the reuse of wastewater and are not directly applicable to a surface water discharge. Nevertheless, the Regional Board found that the treatment level and total coliform effluent limit prescribed in Title 22 for wastewater reused for spray irrigation of

²⁶ Order No. R5-2003-0031, Effluent Limitation B.1. These are 2.2 most probable number per 100 milliliters (MPN/100ml) as a 7-day average and 23 MPN/100ml as an instantaneous maximum.

²⁷ *Ibid.* The turbidity limits are 2.0 nephelometric turbidity units (NTU) and 5.0 NTU as a daily maximum.

²⁸ *Ibid.* The BOD and TSS limits in milligrams per liter are 10, 15, and 20 as a monthly average, weekly average and daily maximum, respectively.

²⁹ Section 13360 prohibits “specify[ing] the design, location, type of construction, or particular manner in which compliance may be had” with waste discharge requirements, other board orders or certain court decrees issued under the Water Code.

³⁰ Order No. R5-2003-0031, Effluent Limitation B.5. See also *id.*, Findings 11 and 12.

³¹ See Cal. Code Regs., tit. 22, § 60301 et seq.

food crops, parks and other publicly-accessible areas were appropriate to protect Tule Canal's agricultural irrigation and contact recreation uses. In reaching this conclusion, the Regional Board properly applied its judgment, guided by the Department's recommendation, to the facts specific to the Woodland discharge.

Finally, Woodland argues that tertiary treatment will have no environmental benefit. Woodland contends that the fecal coliform levels in Tule Canal, upstream and downstream from Woodland's discharge, regularly exceed the Basin Plan water quality objective for REC-1 waters.³² Woodland attributes these levels to nonpoint or natural sources, such as wildlife.

High bacteria levels in waters unaffected by a sewage discharge must be distinguished from high levels in a water impacted by a sewage discharge. Human sewage contains viruses, bacteria, and parasites. Many disease-causing organisms cannot be readily measured. Instead, coliform organisms serve as indicator organisms to measure the presence of bacteria. Whether and to what extent viruses or parasites in surface waters are present cannot be determined, however, based on fecal coliform levels. Tertiary treatment is prescribed for sewage because it is effective in removing viruses, parasites and bacteria. The fact that Tule Canal fecal coliform levels exceed the applicable Basin Plan objective does not justify doing nothing, but rather indicates that the canal lacks assimilative capacity for additional pathogens.

Year-round tertiary treatment, however, may be unnecessary. The Department's recommendations are based on receiving water dilution. For example, the Department recommends tertiary treatment to protect body contact recreation and agricultural uses when effluent is discharged to streams receiving less than 20:1 dilution. For an effluent flow of 6.03 mgd, 20:1 dilution occurs when the background flow in Tule Canal is approximately 195 cfs. When Woodland discharges 7.8 mgd, 20:1 dilution occurs when the canal has a 250 cfs flow. When the discharge increases to 10.4 mgd, 20:1 dilution will occur when the canal has a 330 cfs flow. After possible expansion to 13 mgd, 20:1 dilution will occur when Tule Canal's flow is 402 cfs. Flows of these magnitudes generally occur during December through April.

Accordingly, this order revises the permit to require tertiary treatment when Woodland's discharge receives less than 20:1 dilution. There are ample data for Tule Canal

³² The Basin Plan bacteria objective for REC-1 waters is 200/100 ml as a geometric mean, based on not less than five samples for any 30-day period. Not more than ten percent of the total number of samples taken during any 30-day period can period 400/100 ml. Basin Plan at III-2.00.

when flows are 1000 cfs or greater. According to the United States Geological Survey (USGS), tidal influences prevent accurate measurements when flows are less than 1000 cfs. Woodland asserts otherwise, but did not provide support for this assertion. Until more information is known, Woodland can use existing actual flow data to appropriately size tertiary treatment facilities to handle influent flows when Tule Canal's flows are less than 1000 cfs.

Additionally, Woodland has asked for additional time to complete tertiary facilities. This order extends the time schedule for completion by one year.

Contention: Woodland contends that the Regional Board unjustifiably denied its request to use harmonic mean dilution ratios in calculating effluent limits for human health-based pollutant criteria.

Finding: The Regional Board lacked adequate information on actual dry-season flows in Tule Canal. Given this, the Regional Board properly denied year-round dilution based on the harmonic mean. Dilution may exist; however, an adequate study is needed to assess this issue. Following the conclusion of the study, the permit may be reopened to revise human health-based toxic pollutant effluent limits for human health-based toxic pollutant criteria based on the harmonic mean.

The harmonic mean is a measure of stream flow that must be used under the State Board's Toxics Policy³³ to calculate dilution for human health-based priority pollutant effluent limits.³⁴ It is a measure of long-term dilution. The harmonic mean is calculated through an equation that involves dividing a number by the measured stream flow values.³⁵ A zero flow produces an undefined result; hence, harmonic mean dilution is inappropriate for systems that lack continuous flow.

The Regional Board denied harmonic mean dilution in this case on the ground that Tule Canal is ephemeral. As explained above, the harmonic mean cannot be calculated when a receiving water's flows are periodically zero.³⁶

Woodland disagrees that harmonic mean dilution is not available. Woodland studied Tule Canal flows and estimated the available dilution, based on harmonic mean flows.³⁷

³³ The full name of the policy is "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California," State Board, 2000.

³⁴ Toxics Policy, 1.4.2.1, Table 3.

³⁵ See *id.*, App. 1.

³⁶ Order No. R5-2003-0031, Finding 7.

Woodland obtained flow data from USGS covering the period from 1981 to 1999. The data does not include flow rate data below 1,000 cubic feet per second (cfs) because, according to Woodland, USGS believes tidal influences affect the accuracy of this data. Woodland asserts that the flow data, even at flows below 300 cfs, however, show no tidal influence despite the fact that “[w]ater driven upstream by tidal influences” is one of three main sources of dry season flow to Tule Canal.³⁸

When USGS did not report actual wet weather flows, Woodland assumed values were below 1000 cfs and used 500 cfs as a default value. Calculated average long-term flows for May, June, and November are between 500 and 1000 cfs. It is reasonable to expect that assumptions about wet weather flows below 1000 cfs could have a strong influence on data within this range.

For dry weather flows, presumably all less than 1000 cfs, Woodland used a surrogate to estimate the flow rate. Canal flows were estimated using a chemical dilution calculation method that was based on EC measurements upstream and downstream of the discharge as well as in the effluent. Estimates for July through October were all obtained in this manner. The EC data only cover 2001.

The Board concludes that Woodland’s dilution study was inadequate to accurately assess harmonic mean dilution in Tule Canal. Since the harmonic mean is intended to measure long-term dilution, sampling data from a single year are not sufficient. In addition, it cannot be ascertained whether measurements were made only as tides went out, which would likely produce more apparent dilution than when tides are coming in. Likewise, it is unclear whether Tule Canal flows upstream of the discharge point ever go to zero. It does not appear that there has been a thorough evaluation of this issue. Even Woodland, in the Woodland Recreation Study, noted the inadequacy of dilution ratio estimates using EC measurements and recommended a flow gauge “[t]o provide a more accurate measurement of dilution over the full period of City discharge.”³⁹ The gauge’s range “should be selected to provide readings at the low-flow periods expected during late summer and early fall.”⁴⁰ The Board concurs.

³⁷ See Woodland Recreation Study, fn. 3, *supra*, and Woodland Tule Canal Study, fn. 4, *supra*.

³⁸ Woodland Tule Canal Study, fn. 4, *supra*, at 49.

³⁹ Fn. 3, *supra*, Woodland Recreation Study at 5-4.

⁴⁰ *Ibid.*

Woodland should work with the Regional Board to develop an appropriate study. Once the study results are available, the permit can be reopened to revise human health-based effluent limits for toxic pollutants based on the harmonic mean, if appropriate. This order revises the permit to add a reopener clause for this purpose.

Contention: Woodland objects to permit limits for ammonia on the ground that its discharge did not have the reasonable potential to violate applicable water quality standards. Woodland also contends that the Regional Board improperly used “salmonid-present” criteria guidance to develop the limits because salmonids are not present in Tule Canal.

Finding: The Regional Board properly found reasonable potential for ammonia. This order revises the one-hour average ammonia limits, which are based on the presence of salmonids, because they are not present in Tule Canal from late spring to early fall.

The Regional Board included effluent limits for ammonia in Woodland’s permit⁴¹ to implement the Basin Plan narrative toxicity objective.⁴² In accord with its policy on applying narrative water quality objectives, the Regional Board developed numeric effluent limits based on EPA Clean Water Act section 304(a) criteria guidance for ammonia. The guidance includes an acute value that is a one-hour average and is based on pH. The chronic value is a 30-day average and is based on pH and temperature.

Since the allowable ammonia receiving water concentrations change with site-specific factors, the concentrations are expressed in tabular form in permit attachments B, C, and D. Effluent limits are expressed as 30-day, four-day and one-hour averages. The 30-day and four-day averages are for situations where early life stages of fish are present. The one-hour averages are for situations where salmonids are present.

The Regional Board used procedures recommended by EPA in its Technical Support Document or TSD⁴³ to determine whether the Woodland permit needed ammonia limits. Information from the permit and report of waste discharge indicates that Woodland has detected ammonia (as ammonia nitrogen) in its effluent at concentrations ranging from 0.13 mg/L up to 1.25 mg/L. The maximum effluent temperature was 27.2 degrees centigrade (C) and its highest

⁴¹ See Order No. R5-2003-0031, Effluent Limitation B.1 and Attachments B, C, and D.

⁴² The narrative toxicity objective requires that “[a]ll waters . . . be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.” Basin Plan at III-8.00.

⁴³ Technical Support Document for Water Quality-based Toxics Control, EPA 505 2-90-001 (March 1991).

pH was 8.0. Ammonia is most toxic at high temperatures and high pH. Under the conditions of highest temperature and maximum pH, EPA's chronic ammonia guidance value is approximately 1.09 mg ammonia-N/L. Woodland's highest observed ammonia-N concentration is greater than this. Therefore, reasonable potential exists.

To determine a one-hour value for ammonia, the Regional Board used the EPA criteria guidance intended to protect salmonids. Cold freshwater habitat is designated as an existing, year-round use for Tule Canal. Reliable evidence in the record suggests that salmonids can be present in the canal seasonally from October to May.⁴⁴ The one-hour average value based on salmonid presence should only apply when they are present. This order revises the Woodland permit to clarify that the one-hour average ammonia limit applies only from October 1 to May 31.

Contention: Woodland contends that the Regional Board erred in imposing effluent limits for iron because there was insufficient data to determine reasonable potential.

Finding: The Regional Board properly found reasonable potential for iron. However, the iron effluent limits should not be applied as instantaneous maxima.

The Regional Board included effluent limitations for iron in Woodland's permit⁴⁵ to implement the Basin Plan narrative toxicity objective.⁴⁶ In accordance with its policy on applying narrative objectives, the Regional Board developed numeric limits using EPA ambient water quality criteria guidance for iron. The Regional Board assessed reasonable potential and developed effluent limits using EPA's TSD and a five-sample data set. The data set, although small, was adequate to assess reasonable potential and develop effluent limits.

Iron was detected at 1300 µg/L in Woodland's effluent. EPA's criteria guidance is 1000 µg/L and is a chronic value. The permit establishes concentration and mass limits for iron, which are 1000 µg/L and 65 pounds/day, as instantaneous maxima. Implementing the limits as instantaneous maxima appears to be incorrect because the criteria guidance value, as previously stated, is intended to protect against chronic effects. This order revises the iron limits to 498 µg/L and 32.4 lbs/day, as monthly averages.

⁴⁴ AR, Binder 2, Item 20, letter, dated March 14, 2001, from Michael E. Aceituno, National Marine Fisheries Service, to Betsy Elzufon, Larry Walker Associates.

⁴⁵ See Order No. R5-2003-0031, Effluent Limitation B.1.

⁴⁶ See fn. 42, *supra*.

III. CONCLUSIONS

Based on the above discussion, the Board concludes that:

1. It is appropriate to include effluent limits for EC if the effluent salinity levels can cause or contribute to a water quality standards violation.
2. The Regional Board should consider site-specific factors, such as leaching by rainfall or flooding , in selecting an appropriate EC value to implement the narrative chemical constituents objective and developing appropriate EC effluent limits for the Woodland permit.
3. A study is needed to determine whether site-specific conditions in the Yolo Bypass allow relaxation of the 700 $\mu\text{mhos/sec}$ EC value.
4. An EC limit in Woodland's current permit is premature pending Woodland's timely completion of an appropriate site-specific salinity study and salinity source control program.
5. The Regional Board properly exercised its discretion in requiring Woodland to meet tertiary treatment requirements.
6. Year-round tertiary treatment may be unnecessary.
7. Evidence in the record is inadequate to determine whether harmonic mean dilution is available year-round in Tule Canal.
8. A thorough study, covering an adequate time period, is needed to assess year-round dilution.
9. The Regional Board properly found reasonable potential and included effluent limits for ammonia in Woodland's permit.
10. The one-hour average ammonia limits, which are based on the presence of salmonids, should apply when salmonids are expected to be present.
11. The Regional Board properly found reasonable potential for iron in Woodland's permit.
12. The iron limits should not be applied as instantaneous maxima.

IV. ORDER

IT IS HEREBY ORDERED that Regional Board Order No. R5-2003-0031 and Cease and Desist Order No. R5-2003-0032 are revised as provided in **Attachment A** to this order.

IT IS FURTHER ORDERED THAT the Regional Board shall reevaluate whether effluent EC, boron, and fluoride levels have the reasonable potential to cause or contribute to a water quality standards exceedance once Woodland has completed its site-specific study as described in this order. If the Regional Board finds reasonable potential, the Regional Board shall reopen the permit to include appropriate effluent limits for any or all of these.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on June 17, 2004.

AYE: Arthur G. Baggett, Jr.
Peter S. Silva
Richard Katz
Gary M. Carlton
Nancy H. Sutley

NO: None.

ABSENT: None.

ABSTAIN: None.


Debbie Irvin
Clerk to the Board

ATTACHMENT A

Adopted by SWRCB
WQ Order 2004-0010

I. Order No. R5-2003-0031 (NPDES No. CA0077950)

A. Revise the findings as follows:

1. Add the following to Finding 9 (g) (Ammonia): “U.S. EPA’s Ambient Water Quality Criteria guidance for the protection of aquatic life include criteria guidance for salmonids. Salmonids are known to be present in the Yolo Bypass from October to May. This permit includes one-hour average limits to protect salmonids from October 1 to May 31.”
2. Revise the last sentence of the first paragraph of Finding 9 (h) (Iron) to read: “U.S. EPA has developed the Ambient Water Quality Criterion for the protection of freshwater aquatic life for iron as a chronic value of 1,000 µg/L .”
3. Revise the last sentence of Finding 9 (i) (Fluoride) to read: “Therefore, to protect the agricultural beneficial use, Woodland is required to study and propose appropriate fluoride levels to protect this use .”
4. Revise the last sentence of Finding 9 (l) (Boron) to read: “Therefore, to protect the agricultural beneficial use, Woodland is required to study and propose appropriate boron levels to protect this use .”
5. Delete the last paragraph of Finding 9 (m) (Electrical Conductivity) and replace with:

“The United Nations report indicates that site-specific factors, such as rainfall and flooding, should be considered in determining protective EC levels in irrigation water. Significant flooding occurs in the Yolo Bypass, which could affect EC requirements for irrigation waters used in the bypass. This Order requires that Woodland conduct a site-specific study that assesses the influence of soil chemistry, climatic conditions, rainfall and flooding, and background water quality on EC requirements for irrigation waters diverted from Tule Canal downstream of Woodland’s discharge. This Order also requires that Woodland prepare and implement a salinity source control plan.”

6. Add the following to Finding 11:

“DHS recommends tertiary treatment to protect body contact recreation and agricultural uses when effluent is discharged to streams receiving less than 20:1 dilution. This Order, therefore, requires tertiary treatment or its equivalent when Woodland’s discharge receives less than 20:1 dilution.”

B. Revise the effluent limitations as follows:

1. In Effluent Limitation B.1, delete the instantaneous maximum and substitute monthly average iron limits. The new limits are 498 µg/L and 32.4 lbs/day.
2. In Effluent Limitation B.1, add the following footnote to “Attach. D” for Ammonia: “The one-hour average ammonia limits shall apply from October 1 through May 31.”
3. In Effluent Limitation B.1, delete the effluent limitations for fluoride, boron, and electrical conductivity.
4. Revise Effluent Limitation B.3 to read: “Effluent shall not exceed the following limits (after **30 April 2006**) when the effluent receives less than 20:1 dilution.”
5. Revise Effluent Limitation B.4 to read: “Wastewater shall be oxidized, coagulated and filtered, or equivalent treatment provided by **30 April 2006.**”

C. Revise the provisions as follows:

1. Revise final compliance date in Provision 7 for tertiary treatment to: **“30 April 2006.”**
2. Add a new provision and renumber remaining provisions as appropriate:

“EC, Boron, and Fluoride Study: The Discharger shall complete and submit a report on the results of a site-specific investigation of appropriate EC, boron, and fluoride levels to protect agricultural irrigation in areas irrigated with Tule Canal waters diverted downstream from Woodland’s effluent discharge. The study shall determine the sodium adsorption ratio of soils in the affected area, the effects of rainfall and flood-induced leaching, and background water quality. The study shall evaluate how climate, soil chemistry, background water quality, rainfall and flooding affect EC, boron and fluoride requirements.

Based on these factors, the study shall recommend site-specific numeric values for EC, boron, and fluoride that fully protect Tule Canal’s AGR use designation. The Regional Board will evaluate the recommendations, select appropriate values, reevaluate reasonable potential for the three constituents, and reopen the permit, as necessary, to include appropriate effluent limits for these constituents.

Woodland shall comply with the following time schedule to complete the study:

Task	Compliance Date
<u>Submit Workplan</u>	<u>1 August 2004</u>
<u>Submit Completed Report</u>	<u>1 June 2006”</u>

3. Add the following to Provision 10:

“The Discharger shall develop and implement a salinity source control plan. The plan shall assess salinity sources and identify potential salt control and reduction measures. The assessment shall, at a minimum, evaluate:

- the domestic water supply and mineral pick-up as a result of domestic water use;
- industrial salt sources, salt loading estimates for identified sources, and potential salinity reduction measures for these sources;
- in-plant treatment processes and their effect on conductivity;

The plan shall identify salinity control and reduction measures and include a time schedule for their implementation. The Discharger shall comply with the following time schedule to develop and implement the plan:

<u>Task</u>	<u>Compliance Date</u>
<u>Develop Workplan</u>	<u>1 August 2004</u>
<u>Complete and Submit Salinity Control Plan</u>	<u>1 June 2005</u>
<u>Begin Implementation of Identified Control Measures</u>	<u>Upon Regional Board Approval of Plan</u>

and

Schedule”

4. Add a new provision and renumber remaining provisions:

“If Woodland conducts a thorough dilution study and demonstrates to the Regional Board’s satisfaction that harmonic mean dilution is available, the Regional Board may reopen this

permit and revise human health-based effluent limitations for toxic pollutants accordingly.”

II. Cease and Desist Order No. R5-2003-0032

A. Revise the findings as follows:

1. Revise Finding 2 to read:

“Waste Discharge Requirements Order No. R5-2003-0031 includes Effluent Limitations for mercury, organochlorine pesticides, bis(2-ethylhexyl)phthalate, and aluminum, as contained in Section B.1 , which reads in part as follows:”

Delete effluent limitations included in this Finding for iron, EC, boron, and fluoride.

2. Revise Findings 3, 4, and 5 to delete references to iron, fluoride, electrical conductivity, and boron.

B. Revise the **IT IS HEREBY ORDERED THAT** section to delete references to iron, fluoride, electrical conductivity, and boron.