

C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

Effluent limitations contained in the existing Order for discharges from Discharge Point 001 (Monitoring Location EFF-001) and representative monitoring data from the term of the previous Order are as follows:

Table F-2. Historic Effluent Limitations and Monitoring Data

Parameter	Units	Effluent Limitation			Monitoring Data (1/1/04 – 7/31/07)
		Average Monthly	Average Weekly	Maximum Daily	Highest Daily Discharge
BOD	mg/L	20	40	50	25
	lbs/day	350	700	875	357
TSS	mg/L	30	40	50	60
	lbs/day	525	700	875	756
Total Ammonia	mg/L as N	[1]	---	[1]	4.9
	lbs/day	[1]	---	[1]	51
Chloride	mg/L	650	---	860	400
	lbs/day	11390	---	15071	5711
Copper	mg/L	[2]	---	[2]	110
	lbs/day	[2]	---	[2]	1.28
Electrical Conductivity	µmhos/ cm	2925	---	---	2197
Nitrate (as N)	mg/L	87	---	---	91
	lbs/day	1525	---	---	1147
Nitrate (as NO ₃)	mg/L	392	---	---	403
	lbs/day	6870	---	---	5078
Settleable Solids	mL/L	0.1	---	0.2	0.7
Total Coliform Bacteria	MPN/ 100 mL	---	23 ^[3]	240	1600
TDS	mg/L	1990	---	---	1330
	lbs/day	34874	---	---	20703

[1] Effluent limitations for ammonia in Order No. R5-2003-0067 expressed the USEPA recommended criteria as sliding limits, dependent on pH and temperature. The effluent limitations under the worst case scenario with a pH of 8.1 and a temperature of 26°C were the acute criterion 4.64 mg/L with salmonids present and a 30-day average chronic criterion of 1.00 mg/L.

[2] Effluent limitations for copper in Order R5-2003-0067 were expressed as sliding limits, dependent on hardness up to a hardness of 135 mg/L, at which point the effluent limit was fixed at 165 µg/L. The effluent limitation for copper under the worst case condition of a minimum hardness of 61 mg/L were 55 µg/L as an maximum daily and 30 µg/L as a monthly average.

[3] The total coliform limit is expressed as seven day median.

D. Compliance Summary

The Discharger has been subject to two Administrative Civil Liability Complaints during the term of the previous permit. The first, issued as Order R5-2004-0523, cited 24 serious violations of effluent limitations on copper, and two non-serious violations of effluent limitations for copper and total coliform between April 1, 2002 and March 31, 2004. The second, Order R5-2008-0511, listed 20 non-serious violations of total coliform, copper, and TSS effluent limitations between April 1 2004 and December 31, 2007.

Two sanitary sewer overflows (SSOs) were reported during the term of the previous permit. The first SSO occurred on January 6, 2005 due to a blocked main, which resulted in the release of approximately 5000 gallons to Harbor Bay. The second occurred on June 21, 2005, which was the result of a plugged main. Approximately 700 gallons were released, 5-10 of which entered Indian Bay. Approximately 600 gallons of the overflow were pumped and removed, and the area was sprayed with chlorine solution.

E. Planned Changes

Planning is underway to expand the treatment facility to a design flow of 3.0 mgd.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the applicable plans, policies, and regulations identified in section II of the Limitations and Discharge Requirements (Findings). This section provides supplemental information, where appropriate, for the plans, policies, and regulations relevant to the discharge.

A. Legal Authority

See Limitations and Discharge Requirements - Findings, Section II.C.

B. California Environmental Quality Act (CEQA)

See Limitations and Discharge Requirements - Findings, Section II.E.

C. State and Federal Regulations, Policies, and Plans

- 1. Water Quality Control Plans.** The Regional Water Board adopted a *Water Quality Control Plan, Fourth Edition (Revised August 2006), for the Sacramento and San Joaquin River Basins* (Basin Plan) that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, State Water Board Resolution No. 88-63 requires that, with certain exceptions, the Regional Water Board assign the municipal and domestic supply use to water bodies that do not have beneficial uses listed in the Basin Plan. The beneficial uses of Old River

downstream of the discharge are municipal and domestic supply, agricultural irrigation, agricultural stock watering, industrial process water supply, industrial service supply, water contact recreation, other non-contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, wildlife habitat, and navigation.

The Basin Plan on page II-1.00 states: "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning..." and with respect to disposal of wastewaters states that "...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses."

The federal CWA section 101(a)(2), states: "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and for recreation in and on the water be achieved by July 1, 1983." Federal Regulations, developed to implement the requirements of the CWA, create a rebuttable presumption that all waters be designated as fishable and swimmable. Federal Regulations, 40 CFR sections 131.2 and 131.10, require that all waters of the State are regulated to protect the beneficial uses of public water supply, protection and propagation of fish, shell fish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation. Section 131.3(e), 40 CFR, defines existing beneficial uses as those uses actually attained after November 28, 1975, whether or not they are included in the water quality standards. Federal Regulation, 40 CFR section 131.10 requires that uses be obtained by implementing effluent limitations, requires that all downstream uses be protected and states that in no case shall a state adopt waste transport or waste assimilation as a beneficial use for any waters of the United States.

2. **Thermal Plan.** The State Water Board adopted a *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California* (Thermal Plan) on May 18, 1972, and amended this plan on September 18, 1975. This plan contains temperature objectives for surface waters, including estuaries. The Thermal Plan applies to all discharges to the Sacramento-San Joaquin Delta. Requirements of this Order implement the Thermal Plan.
3. **Bay-Delta Plan.** The State Water Board *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (Bay-Delta Plan) was most recently revised in December 2006. The Bay-Delta Plan identifies the beneficial uses of the estuary and includes objectives for flow, salinity, and endangered species protection. The water quality objectives of the Bay-Delta Plan are implemented as part of this Order.
4. **Antidegradation Policy.** Section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water

Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. As discussed in detail in the Fact Sheet (Attachment F, Section IV.D.4.) the discharge is consistent with the antidegradation provisions of 40 CFR section 131.12 and State Water Board Resolution 68-16.

5. **Anti-Backsliding Requirements.** Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at title 40, Code of Federal Regulations section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed. Compliance with anti-backsliding requirements is discussed in Section IV.D.3.
6. **Emergency Planning and Community Right to Know Act.** Section 13263.6(a), California Water Code, requires that "the Regional Water Board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRA) indicate as discharged into the POTW, for which the State Water Board or the Regional Water Board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective".

The Regional Water Board has adopted numeric receiving water objectives for arsenic, barium, copper, cyanide, iron, silver, and zinc applicable to the Sacramento-San Joaquin Delta in the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Basin Plan). As detailed elsewhere in this Permit, available effluent quality data indicate that effluent concentrations of copper and iron do have reasonable potential to cause or contribute to an excursion above numeric water quality objectives included within the Basin Plan. The most recent toxic chemical data report does not indicate any reportable off-site releases or discharges to the collection system for this facility. Therefore, a reasonable potential analysis based on information from Emergency Planning and Community Right to Know Act (EPCRA) cannot be conducted. Based on information from EPCRA, there is no reasonable potential to cause or contribute to an excursion above any numeric water quality objectives included within the Basin Plan or in any State Water Board plan, so no effluent limitations are included in this permit pursuant to CWC section 13263.6(a).

However, as detailed elsewhere in this Order, available effluent data indicate that there are constituents present in the effluent that have a reasonable potential to

cause or contribute to exceedances of water quality standards and require inclusion of effluent limitations based on federal and state laws and regulations.

7. **Stormwater Requirements.** USEPA promulgated Federal Regulations for storm water on 16 November 1990 in 40 CFR Parts 122, 123, and 124. The NPDES Industrial Storm Water Program regulates storm water discharges from wastewater treatment facilities. Wastewater treatment plants are applicable industries under the stormwater program and are obligated to comply with the Federal Regulations.
8. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state. The Discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

D. Impaired Water Bodies on CWA 303(d) List

1. Under Section 303(d) of the 1972 Clean Water Act, states, territories and authorized tribes are required to develop lists of water quality limited segments. The waters on these lists do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. On July 25, 2003 USEPA gave final approval to California's 2002 Section 303(d) List of Water Quality Limited Segments. The Basin Plan references this list of Water Quality Limited Segments (WQLSs), which are defined as "...those sections of lakes, streams, rivers or other fresh water bodies where water quality does not meet (or is not expected to meet) water quality standards even after the application of appropriate limitations for point sources (40 CFR 130, et seq.)." The Basin Plan also states, "Additional treatment beyond minimum federal standards will be imposed on dischargers to [WQLSs]. Dischargers will be assigned or allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment." Old River between the San Joaquin River and the Delta Mendota Canal is 303(d) listed for low dissolved oxygen – this segment of Old River is south of the discharge location. The southern portion of the Delta Waterways, which includes Old River, is also listed for chlorpyrifos, DDT, diazinon, electrical conductivity, exotic species, Group A pesticides, mercury, and unknown toxicity.
2. **Total Maximum Daily Loads.** The USEPA requires the Regional Water Board to develop total maximum daily loads (TMDLs) for each 303(d) listed pollutant and water body combination. The TMDL for mercury for the Sacramento-San Joaquin Delta is currently being developed, and TMDL development for Group A pesticides and DDT is scheduled for completion on 2011. The remaining constituents are scheduled for a proposed TMDL completion in 2019.

E. Other Plans, Policies and Regulations

1. The discharge authorized herein and the treatment and storage facilities associated with the discharge of treated municipal wastewater, except for discharges of residual sludge and solid waste, are exempt from the requirements of Title 27, California Code of Regulations (CCR), section 20005 *et seq.* (hereafter Title 27). The exemption, pursuant to Title 27 CCR section 20090(a), is based on the following:

- The waste consists primarily of domestic sewage and treated effluent;
- The waste discharge requirements are consistent with water quality objectives; and
- The treatment and storage facilities described herein are associated with a municipal wastewater treatment plant.

The State Water Board adopted the *Water Quality Control Policy for the Enclosed Bays and Estuaries of California*. The requirements within this Order are consistent with the Policy.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

Effluent limitations and toxic and pretreatment effluent standards established pursuant to Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.

The Federal CWA mandates the implementation of effluent limitations that are as stringent as necessary to meet water quality standards established pursuant to state or federal law [33 U.S.C., § 1311(b)(1)(C); 40 CFR, § 122.44(d)(1)]. NPDES permits must incorporate discharge limits necessary to ensure that water quality standards are met.

This requirement applies to narrative criteria as well as to criteria specifying maximum amounts of particular pollutants. Pursuant to Federal Regulations, 40 CFR Section 122.44(d)(1)(i), NPDES permits must contain limits that control all pollutants that "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." Federal Regulations, 40 CFR, §122.44(d)(1)(vi), further provide that "[w]here a state has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits."

The CWA requires point source discharges to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations

and other requirements in NPDES permits. There are two principal bases for effluent limitations: 40 CFR §122.44(a) requires that permits include applicable technology-based limitations and standards, and 40 CFR §122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water where numeric water quality objectives have not been established. The Regional Water Board's Basin Plan, page IV-16.00, contains an implementation policy ("Policy for Application of Water Quality Objectives") that specifies that the Regional Water Board "will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives." This Policy complies with 40 CFR §122.44(d)(1). With respect to narrative objectives, the Regional Water Board must establish effluent limitations using one or more of three specified sources, including (1) EPA's published water quality criteria, (2) a proposed state criterion (i.e., water quality objective) or an explicit state policy interpreting its narrative water quality criteria (i.e., the Regional Water Board's "Policy for Application of Water Quality Objectives")(40 CFR 122.44(d)(1) (vi) (A), (B) or (C)), or (3) an indicator parameter. The Basin Plan contains a narrative objective requiring that: "All 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). The Basin Plan requires the application of the relevant and appropriate objectives necessary to ensure that surface water and groundwater do not contain chemical constituents, discoloration, toxic substances, radionuclides, or taste and odor producing substances that adversely affect beneficial uses. The Basin Plan states that material and relevant information, including numeric criteria, and recommendations from other agencies and scientific literature will be utilized in evaluating compliance with the narrative toxicity objective. The Basin Plan also limits chemical constituents in concentrations that adversely affect surface water beneficial uses. For waters designated as municipal, the Basin Plan specifies that, at a minimum, waters shall not contain concentrations of constituents that exceed Maximum Contaminant Levels (MCL) of CCR Title 22. The Basin Plan further states that, to protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs.

A. Discharge Prohibitions

1. As stated in section I.G of Attachment D, Standard Provisions, this Order prohibits bypass from any portion of the treatment facility. Federal Regulations, 40 CFR 122.41 (m), define "bypass" as the intentional diversion of waste streams from any portion of a treatment facility. This section of the Federal Regulations, 40 CFR 122.41 (m)(4), prohibits bypass unless it is unavoidable to prevent loss of life, personal injury, or severe property damage. In considering the Regional Water Board's prohibition of bypasses, the State Water Board adopted a precedential decision, Order No. WQO 2002-0015, which cites the Federal Regulations, 40 CFR 122.41(m), as allowing bypass only for essential maintenance to assure efficient operation.

B. Technology-Based Effluent Limitations

1. Scope and Authority

Regulations promulgated in section 125.3(a)(1) require technology-based effluent limitations for municipal Dischargers to be placed in NPDES permits based on Secondary Treatment Standards or Equivalent to Secondary Treatment Standards.

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) established the minimum performance requirements for POTWs [defined in section 304(d)(1)]. Section 301(b)(1)(B) of that Act requires that such treatment works must, as a minimum, meet effluent limitations based on secondary treatment as defined by the USEPA Administrator.

Based on this statutory requirement, USEPA developed secondary treatment regulations, which are specified in Part 133. These technology-based regulations apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of biochemical oxygen demand (BOD₅), total suspended solids (TSS), and pH.

2. Applicable Technology-Based Effluent Limitations

- a. **BOD₅ and TSS.** Federal Regulations, 40 CFR, Part 133, establish the minimum weekly and monthly average level of effluent quality attainable by secondary treatment for BOD₅ and TSS. A daily maximum effluent limitation for BOD₅ and TSS is also included in the Order to ensure that the treatment works are not organically overloaded and operate in accordance with design capabilities. In addition, 40 CFR 133.102, in describing the minimum level of effluent quality attainable by secondary treatment, states that the 30-day average percent removal shall not be less than 85 percent. This Order contains a limitation requiring an average of 85 percent removal of BOD₅ and TSS over each calendar month. The previous Order required BOD₅ and TSS effluent limitations more stringent than required by 40 CFR Part 133, because the receiving water is listed for low dissolved oxygen. The more stringent effluent limit on BOD₅ effectively prevents the discharge from further contributing to low dissolved oxygen levels in Old River. To satisfy anti-backsliding requirements, this Order retains these effluent limitations. The Discharger's level of treatment has maintained compliance with these effluent limitations during the term of the previous permit.
- b. **pH.** Secondary treatment requirements at 40 CFR Part 133 limit pH between 6.0 and 9.0. The previous Order contained a more stringent limit for pH of 6.5 and 8.5 to protect beneficial uses of the receiving water, and has been retained in the current Order.
- c. **Flow.** The Discovery Bay Wastewater Treatment Plant was designed to provide a secondary level of treatment for up to a design flow of 2.1 mgd. Therefore, this Order contains an Average Daily Discharge Flow effluent limit of 2.1 mgd.

Table F-3. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
BOD ₅ @ 20°C	mg/L	20	40	50	---	---
	lbs/day ^[1]	350	700	875	---	---
TSS	mg/L	30	40	50	---	---
	lbs/day ^[1]	525	700	875	---	---
pH	pH units	---	---	---	6.5	8.5

^[1] Based on a flow of 2.1 mgd.

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

As specified in section 122.44(d)(1)(i), permits are required to include WQBELs for pollutants (including toxicity) that are or may be discharged at levels that cause, have reasonable potential to cause, or contribute to an in-stream excursion above any state water quality standard. The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

- a. **Receiving Water.** The receiving water for this discharge is Old River, within the San Joaquin Delta Hydrologic Unit. The beneficial uses for the receiving water are described in Section III.C. 1 of this Fact Sheet.
- b. **Hardness.** While no effluent limitation for hardness is necessary in this Order, hardness is critical to the assessment of the need for, and the development of, effluent limitations for certain metals. The *California Toxics Rule* and the *National Toxics Rule* contain water quality criteria for seven metals that vary as a function of hardness, i.e., as the hardness value decreases, the corresponding water quality criteria also decrease. The hardness-dependent metal criteria include cadmium, copper, chromium III, lead, nickel, silver, and zinc. Effluent limitations for the discharge must be set to protect the beneficial uses of the receiving water for all discharge conditions. In the absence of the option of including condition-dependent, "floating" effluent limitations that are reflective of actual hardness conditions at the time of discharge, effluent limitations must be set using a reasonable worst-case condition in order to protect beneficial uses for all discharge conditions. The SIP does not address how to determine hardness for application to the equations for the protection of aquatic life when using

hardness-dependent metals criteria. It simply states, in Section 1.2, that the criteria shall be properly adjusted for hardness using the hardness of the receiving water. The CTR requires that, for waters with a hardness of 400 mg/L (as CaCO₃), or less, the actual ambient hardness of the surface water must be used. It further requires that the hardness values used must be consistent with the design discharge conditions for design flows and mixing zones.¹ The CTR does not define whether the term “ambient,” as applied in the regulations, necessarily requires the consideration of upstream as opposed to downstream hardness conditions. The point in the receiving water affected by the discharge is downstream of the discharge. As the effluent mixes with the receiving water, the hardness of the receiving water can change. Therefore, it is appropriate to use the ambient hardness downstream of the discharge that is a mixture of the effluent and receiving water for the determination of the CTR hardness-dependent metals criteria. Recent studies indicate that using the lowest recorded receiving water hardness for establishing water quality criteria is not always protective of the receiving water under various mixing conditions (e.g. when the effluent hardness is less than the receiving water hardness). The studies evaluated the relationships between hardness and the CTR metals criterion that is calculated using the CTR metals equation. The equation describing the total recoverable regulatory criterion is as follows:

Total Recoverable Criterion = $e^{m[\ln(H)] + b}$, where
m = criterion specific constant,
H = effluent hardness, and
b = criterion specific constant

The constants “m” and “b” are specific to both the metal under consideration, and the type of total recoverable criterion, i.e. acute or chronic.

Effluent limitations for the discharge must be set to protect the beneficial uses of the receiving water for all discharge conditions. The State Water Board, in footnote 19 to Water Quality Order No. 2004-0013, stated: “We note that... the Regional Water Board... applied a variable hardness value whereby effluent limitations will vary depending on the actual, current hardness values in the receiving water. We recommend that the Regional Water Board establish either fixed or seasonal effluent limitations for metals, as provided in the SIP, rather than ‘floating’ effluent limitations.”

In the absence of the option of including condition-dependent, “floating” effluent limitations that are reflective of actual conditions at the time of discharge, effluent limitations must be set using a reasonable worst-case condition in order to protect beneficial uses for all discharge conditions. Recent studies indicate that using the receiving water lowest hardness for establishing water quality criteria is not the most protective for the receiving water. The Regional Water Board has evaluated these studies and concurs that for some parameters the beneficial uses of the receiving water are best protected using the lowest hardness value of the effluent, while for some parameters, the use of both the lowest hardness

value of the receiving water and the lowest hardness value of the effluent is most protective.

Because of the non-linearity of the Total Recoverable Criterion equation, the relationship can either be concave upward or concave downward depending in the criterion-specific constants. For those contaminants whereby the regulatory criteria exhibit a concave downward relationship as a function of hardness (e.g., acute and chronic copper, chromium(III), nickel, and zinc; and chronic cadmium), the use of the lowest recorded effluent hardness for establishment of water quality objectives is fully protective of all beneficial uses regardless of whether the effluent or receiving water hardness is higher. For purposes of establishing water quality-based effluent limitations, a reported minimum effluent hardness value of 204 mg/L as CaCO₃ and a minimum receiving water hardness of 32.3 mg/L as CaCO₃ were used.

- c. Assimilative Capacity/Mixing Zone.** The SIP in section 1.4.2 states that dilution credits may be granted to dischargers in calculating effluent limitations. During the term of the previous Order, the Discharger initiated discharge into Old River through a diffuser. Old River in the vicinity of the discharge is influenced by natural tide cycles, and by Delta water exports. The previous Order required a study to verify that the new diffuser achieved the dilution levels the diffuser was designed to achieve, confirm that Old River has sufficient assimilative capacity for the constituents of concern, and examine flow reversals in the receiving water and evaluate conditions during the ten-year, worst-case, low-flow condition within the receiving water. The complete study can be found in the Discharger's Report of Waste Discharge. The mixing zone allowed is 105 feet wide, 13.5 feet deep, and 5 feet in longitudinal diameter. Flow Science conducted a dye study on 6 and 7 December 2005 and conducted diffuser modeling using the Visual Plumes dilution model to determine assimilative capacity of the receiving water for the discharge and initial dilution of the effluent.

The dye study was conducted on those dates due to the results of flow modeling done using the Fischer Delta Model. The dye study was scheduled for a time when the river would be bi-directional and when slack tides would be most likely to occur. Data collected during the study were used to verify model predictions of plume behavior. Prior to the study, a tide/velocity gauge was installed approximately 100 meters south of the diffuser. On the first day of the dye study, a mixture of fluorescent dye and a conservative tracer (lithium, as lithium chloride) were added to the effluent stream. The resulting plume was measured by a boat mounted fluorometer. Periodic grab samples were taken to measure the lithium chloride concentration. On the second day of testing, a second fluorescent dye was added to the effluent. The sampling boat stayed near the diffuser during this test to evaluate diffuser performance.

Field measurements demonstrated the effluent was diluted rapidly after discharge. Measurements of the lithium chloride concentrations were generally consistent with the fluorescent measurements.

The results indicate that for the 10-year worst case concentration of effluent, Old River has an assimilative capacity to provide a dilution of 13.2:1 for the acute condition and a dilution of 23:1 for the chronic condition. Assumed conditions for the worst case scenario included an effluent flow rate of 3.0 mgd, zero river velocity, and low tide. The acute and chronic dilution factors above were utilized in determining effluent limitations for pollutants with reasonable potential. The results of the studies and modeling confirm the mixing zone established in the previous Order are protective and that performance is greater than estimated in the initial mixing zone study (see Order No. R5-2003-0067 for a description of the Zone of Initial Dilution and Assimilative Capacity Analysis). The size of the mixing zone is consistent with that found in Order No. R5-2003-0067.

3. Determining the Need for WQBELs

- a. CWA section 301 (b)(1) requires NPDES permits to include effluent limitations that achieve technology-based standards and any more stringent limitations necessary to meet water quality standards. Water quality standards include Regional Water Board Basin Plan beneficial uses and narrative and numeric water quality objectives, State Water Board-adopted standards, and federal standards, including the CTR and NTR. The Basin Plan includes numeric site-specific water quality objectives and narrative objectives for toxicity, chemical constituents, and tastes and odors. The narrative toxicity objective states "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life." (Basin Plan at III-8.00.) With regards to the narrative chemical constituents objective, the Basin Plan states that waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At minimum, "...water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs)" in Title 22 of CCR. The narrative tastes and odors objective states "Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses."
- b. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. Based on information submitted as part of the application, in studies, and as directed by monitoring and reporting programs, the Regional Water Board finds that the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for copper, aluminum, salinity, iron, ammonia, and nitrate. Water quality-based effluent limitations (WQBELs) for most of these constituents are included in this Order. A summary of the reasonable potential analysis (RPA) is provided in Attachment G, and a detailed discussion of the RPA for each constituent is provided below.

- c. The Regional Water Board conducted the RPA in accordance with Section 1.3 of the SIP. Although the SIP applies directly to the control of CTR priority pollutants, the State Water Board has held that the Regional Water Board may use the SIP as guidance for water quality-based toxics control.¹ The SIP states in the introduction "The goal of this Policy is to establish a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency." Therefore, except when specified, this Order uses the RPA procedures from the SIP to evaluate reasonable potential for CTR constituents and uses the RPA procedures from the SIP when applicable and appropriate to evaluate reasonable potential for non-CTR constituents.
- d. WQBELs were calculated in accordance with section 1.4 of the SIP, as described in Attachment F, Section IV.C.4.
- e. **Aluminum.** USEPA developed National Recommended Ambient Water Quality Criteria for protection of freshwater aquatic life for aluminum. The recommended 4-day average (chronic) and 1-hour average (acute) criteria for aluminum are 87 µg/L and 750 µg/L, respectively. The Secondary Maximum Contaminant Level - Consumer Acceptance Limit for aluminum is 200 µg/L. During the effective timeframe of the current Order, the Discharger constructed a diffuser and commenced discharging to the Old River. There have been additional upgrades to the treatment system.

Footnote L to the National Recommended Ambient Water Quality Criteria summary table for aluminum indicates that the chronic aquatic life criterion is based on studies conducted under specific receiving water conditions with a low pH (6.5 to 6.8 pH units) and low hardness (<10 mg/L as CaCO₃). Monitoring data demonstrates that these conditions are not similar to those in Old River, which consistently has an upstream pH greater than 7.0 and hardness concentrations ranging from 32 to 156 mg/L. Thus, it is unlikely that application of the chronic criterion of 87 µg/L is necessary to protect aquatic life in Old River.

The MEC for aluminum was 490 µg/L. In the absence of an applicable chronic aquatic life criterion, the most stringent water quality criterion is the Secondary MCL - Consumer Acceptance Limit for aluminum of 200 µg/L. An annual average effluent limitation of 200 µg/L is being established. Based on the Discharger's effluent data, it is feasible for the Discharger to comply immediately with these limitations.

- f. **Ammonia.** Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. The

¹ See, Order WQO 2001-16 (Napa) and Order WQO 2004-0013 (Yuba City)

Discharger currently uses nitrification and denitrification to remove ammonia from the waste stream. The oxidation ditches at both plants operate for nitrification and denitrification, and discharge low concentrations of ammonia. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. Discharges of ammonia would violate the Basin Plan narrative toxicity objective. Applying 40 CFR section 122.44(d)(1)(vi)(B), it is appropriate to use USEPA's Ambient National Water Quality Criteria for the Protection of Freshwater Aquatic Life for ammonia, which was developed to be protective of aquatic organisms.

USEPA's *Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life*, for total ammonia, recommends acute (1-hour average; criteria maximum concentration) standards based on pH and chronic (30-day average, criteria continuous concentration) standards based on pH and temperature. It also recommends a maximum four-day average concentration of 2.5 times the criteria continuous concentration. USEPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. USEPA's recommended criteria are shown below:

$$CCC_{30\text{-day}} = \left(\frac{0.0577}{1 + 10^{7.688 - \text{pH}}} + \frac{2.487}{1 + 10^{\text{pH} - 7.688}} \right) \times \text{MIN}(2.85, 1.45 \cdot 10^{0.028(25 - T)}), \text{ and}$$
$$CMC = \left(\frac{0.275}{1 + 10^{7.204 - \text{pH}}} + \frac{39.0}{1 + 10^{\text{pH} - 7.204}} \right),$$

where T is in degrees Celsius

The maximum permitted effluent pH is 8.5. In order to protect against the worst-case short-term exposure of an organism, a pH value of 8.5 was used to derive the acute criterion. The resulting acute criterion is 2.14 mg/L.

The maximum observed rolling 30-day average temperature and the maximum observed pH of the effluent and receiving water during the period when the maximum observed rolling 30-day average temperature occurred were used to calculate the 30-day CCC. The maximum observed effluent 30-day rolling average temperature was 26.6°C. The maximum observed effluent pH value during the period when the maximum observed rolling 30-day average temperature was 7.8.

Using a pH value of 7.8 and the highest temperature value of 26.6°C on a rolling 30-day basis, the resulting 30-day CCC is 1.46 mg/L (as N). The 4-day average concentration is derived in accordance with the USEPA criterion as 2.5 times the

30-day CCC. Based on a 30-day CCC of 1.46 mg/L (as N), the 4-day average concentration that should not be exceeded is 3.65 mg/L (as N).

The MEC for ammonia was 4.9 mg/L. Therefore, ammonia in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a level necessary to protect aquatic life resulting in a violation of the Basin Plan's narrative toxicity objective.

The SIP procedure assumes a 4-day averaging period for calculating the long term average discharge condition (LTA). However, USEPA recommends modifying the procedure for calculating permit limits for ammonia using a 30-day averaging period for the calculation of the LTA corresponding to the 30-day chronic criteria. Therefore, while the LTAs corresponding to the acute and 4-day chronic criteria were calculated according to SIP procedures, the LTA corresponding to the 30-day chronic criteria was calculated assuming a 30-day averaging period. The lowest LTA representing the acute, 4-day, and 30-day chronic criteria is then selected for deriving the AMEL and the MDEL. The remainder of the WQBEL calculation for ammonia was performed according to the SIP procedures.

This Order contains a final AMEL and MDEL for ammonia of 10.1 mg/L and 30 mg/L, respectively, based on USEPA's National Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life and to assure the treatment process adequately nitrifies the waste stream to protect the aquatic habitat beneficial uses. Based on the Discharger's effluent data, it is feasible for the Discharger to comply immediately with these limitations.

Research has demonstrated that ammonia can inhibit growth of marine diatoms at ammonia concentrations in the receiving water much lower than ammonia concentrations that impact fish species. Studies are in progress examining possible impacts of ammonia on growth of fresh water diatoms that exist in the Delta in the vicinity of this discharge. The Delta has a relative low primary productivity for an estuarine environment. If ammonia inhibition of fresh water diatoms does occur, it is possible that lowered primary productivity from diatom inhibition could be a contributing factor to Delta aquatic problems. If ammonia inhibition of diatoms is confirmed, this permit will be reopened to reconsider the ammonia effluent limitation.

- g. Copper.** The CTR includes hardness-dependent criteria for the protection of freshwater aquatic life for copper. The criteria for copper are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. The USEPA default conversion factors for copper in freshwater are 0.96 for both the acute and the chronic criteria. Using the worst-case measured hardness from the effluent and receiving water and the USEPA recommended dissolved-to-total translator, the applicable chronic criterion (maximum four-day average concentration) is 17.2 µg/L and the applicable acute criterion (maximum one-hour average

concentration) is 27.4 µg/L, as total recoverable.

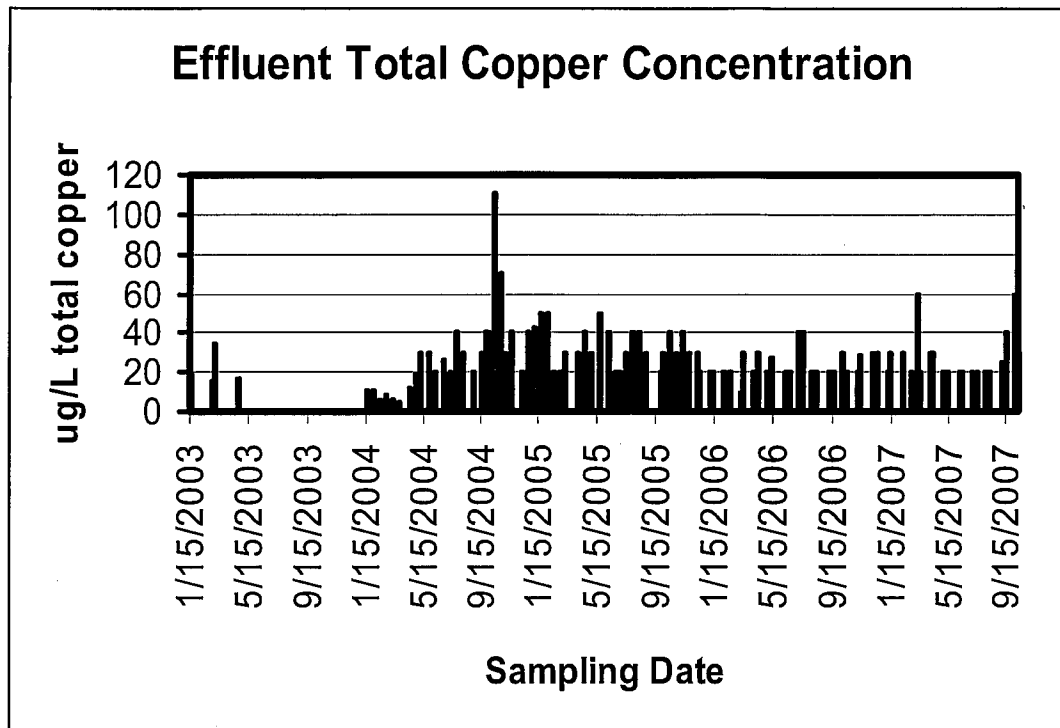
The MEC for total copper was 110 µg/L, based on 101 samples collected between 1/15/03 and 10/10/07, while the maximum observed upstream receiving water total copper concentration was 2.9 µg/L, based on 13 samples collected between 1/28/04 and 12/22/04. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for copper. Calculated using an acute dilution credit of 13.2 and a chronic dilution credit of 23, an AMEL and MDEL for total copper of 172 µg/L and 323 µg/L, respectively, are the resulting effluent limitations based on CTR criteria for the protection of freshwater aquatic life (See Attachment F, Table F-8 for WQBEL calculations).

The copper effluent limitations based on CTR criteria are hardness dependent. The Basin Plan Table III-1 contains a site specific criterion of 10 µg/L for copper, which is independent of hardness. Using the USEPA recommended dissolved-to-total translator, the site-specific water quality objective is 10.4 µg/L as total recoverable copper. The MDEL calculated using this criterion of 10.4 µg/L, a dilution factor of 23, and using the procedure given by section 1.4 of the SIP, results in a limit more stringent than the MDEL calculated from the CTR criterion, as shown by the following equation.

Effluent Concentration Allowance = $C + D(C-B)$,
where C is the criterion,
D is the dilution credit, and
B is the background concentration.

Here, $ECA = 10.4 + 23(10.4 - 5) = 135$ µg/L. Therefore, a final effluent for copper of 135 µg/L as a maximum daily effluent limitation could be established, but almost the entire assimilative capacity of the receiving water would be used.

Table F-4. Effluent Total Copper Concentration



The above chart graphs effluent total copper concentrations for the time period being evaluated. It is apparent that the Discharger can comply with effluent copper limitations more stringent than calculated from either the CTR or Basin Plan water quality objectives. Given both the continuing problems with aquatic life in the Delta, and the federal and state Anti-Degradation Policies, effluent limitations for toxic constituents should be set as low as practical, even if higher concentrations would not result in toxic conditions in the receiving water. Based upon examination of the above chart, and using Best Professional Judgment, the Average Monthly Effluent Limitation is set at 50 ug/L, and the Maximum Daily Effluent Limitation is set at 70 ug/L.

h. Electrical Conductivity. (see Subsection p. Salinity)

- i. **Iron.** The Secondary MCL - Consumer Acceptance Limit for iron is 300 µg/L. The Basin Plan at Table III-1 also requires a site specific criterion for iron of 300 µg/L. The MEC for iron was 350 µg/L, based on 11 samples collected between 1/1/04 and 7/31/07. The maximum effluent annual average concentration was 138 µg/L, based on monitoring results. The maximum observed upstream receiving water iron concentration was 1300 µg/L, based on 3 samples collected between 1/15/03 and 4/23/03. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Secondary MCL for iron. Therefore, an annual average effluent limit of 300 µg/L for iron is included in this Order based on protection of the Basin Plan's narrative chemical

constituents objective. Based on the sample results in the effluent, it appears the Discharger can meet this new limitation.

- j. **Manganese.** Table III-1 of the Basin Plan establishes a water quality criterion of 50 µg/L, applicable to the Delta, for manganese. In addition, the Regional Water Board considers the receiving water to be compliant with the Basin Plan's narrative water quality objective for chemical constituents when manganese concentrations are below the secondary MCL for manganese.

The MEC for manganese was 123 µg/L, based on 5 samples collected between 1/15/03 and 1/11/06. The four other sample results were 16 mg/L, 31 mg/L, 15 mg/L, and 10 mg/L. Three effluent sample events occurred in 2003, which resulted in an annual average of 20.7 µg/L (16, 31, and 15 mg/L respectively), one sample event in 2005 resulted in an effluent concentration of 123 µg/L, and one sample event in 2006 resulted in an effluent concentration of 10 µg/L. The maximum observed upstream receiving water manganese concentration was 40 µg/L, based on 3 samples collected between 1/15/03 and 4/23/03.

With the exception of the single 123 µg/L result, effluent manganese concentrations have consistently been below the 50 µg/L water quality objective. The 123 µg/L sample is inconsistent with the other results, and it is unlikely that a domestic wastewater would have that significant a change in effluent manganese for a single sample. The 123 µg/L result is considered to be an outlier and is not included in the reasonable potential analysis. Effluent limitations are not being established at this time. Monitoring of the effluent is required in order to determine if the discharge has a reasonable potential to cause, or contribute to an excursion above any state water quality standard.

- k. **Nitrate.** Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. Nitrate and nitrite are known to cause adverse health effects in humans. The California DHS has adopted Primary MCLs at Title 22 of the California Code of Regulations (CCR), Table 64431-A, for the protection of human health for nitrite and nitrate that are equal to 1 mg/L and 10 mg/L (measured as nitrogen), respectively. Title 22 CCR, Table 64431-A, also includes a primary MCL of 10,000 µg/L for the sum of nitrate and nitrite, measured as nitrogen.

For nitrate, USEPA has developed Drinking Water Standards (10,000 µg/L as Primary Maximum Contaminant Level) and Ambient Water Quality Criteria for protection of human health (10,000 µg/L for non-cancer health effects). Recent toxicity studies have indicated a possibility that nitrate is toxic to aquatic organisms.

Inadequate or incomplete denitrification may result in the discharge of nitrate and/or nitrite to the receiving stream. The conversion of ammonia to nitrites and the conversion of nitrites to nitrates present a reasonable potential for the

discharge to cause or contribute to an in-stream excursion above the Primary MCLs for nitrite and nitrate. Nitrate was detected in 103 samples from 1/14/04 – 10/10/07, with a maximum of 91 mg/L as N on 6/8/05. Therefore there is reasonable potential for nitrate to exceed the most stringent objective, and an AMEL of 73 mg/L and an MDEL of 126 mg/L nitrate as N are included in this Order based on the MCL and calculated with a dilution credit of 13.2. These effluent limitations are included in this Order to assure the treatment process adequately nitrifies and denitrifies the waste stream to protect the beneficial use of municipal and domestic supply.

- i. Pathogens.** The beneficial uses of Old River include municipal and domestic supply, water contact recreation, and agricultural irrigation supply. Coliform limits are imposed to protect the beneficial uses of the receiving water, including public health through contact recreation and drinking water pathways. In a letter to the Regional Water Board dated 8 April 1999, the California Department of Health Services (now Department of Public Health) indicated that DHS would consider wastewater discharged to water bodies with identified beneficial uses of irrigation or contact recreation and where the wastewater receives dilution of more than 20:1 to be adequately disinfected if the effluent coliform concentration does not exceed 23 MPN/100 mL as a 7-day median and if the effluent coliform concentration does not exceed 240 MPN/100 mL more than once in any 30 day period. Furthermore, the DHS provided a letter dated 1 July 2003 that included clarification of the recommendations. The letter states, "*A filtered and disinfected effluent should be required in situations where critical beneficial uses (i.e. food crop irrigation or body contact recreation) are made of the receiving waters unless a 20:1 dilution ration (DR) is available. In these circumstances, a secondary, 23 MPN discharge is acceptable.*" This Order is consistent with these recommendations, considering site-specific factors. Therefore, the 23 MPN/100 mL limitation is found to be appropriate, and is retained from the previous permit. The coliform effluent limitations are adequately protective of the water contact recreation and agricultural irrigation supply beneficial uses of the receiving water in the vicinity of the discharge. In addition, for MUN-designated water bodies, DPH has not recommended treatment beyond secondary with 20:1 dilution, or tertiary without 20:1 dilution, where there were no known users of untreated water near a treatment plant outfall. Based on a review of the State Water Boards eWRIMS water rights database, there is no evidence of the untreated domestic use of the raw water in the vicinity of the discharge. Therefore, the coliform effluent limitations are also adequately protective of the MUN use.
- m. pH.** The Basin Plan includes a water quality objective for surface waters (except for Goose Lake) that the "...pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses." Effluent Limitations for pH are included in this Order based on the Basin Plan objectives for pH.
- n. Salinity.** The State Water Resources Control Board has established salinity standards in the *Water Quality Control Plan for the San Francisco Bay*,

Sacramento-San Joaquin Delta Estuary. The State Water Board prescribed numeric chloride and electrical conductivity standards to protect agricultural irrigation at several locations in the Delta, including in the West Canal at Mouth of Clifton Court Forebay (the entrance to the State Water Project canal). This location is south of the discharge location along Old River, which is the "downstream" direction of Old River during irrigation and low flow seasons in the Delta. The salinity objective for West Canal is 1000 $\mu\text{mhos/cm}$ year around for electrical conductivity and 250 mg/L for chloride. The 2006 update of the Bay Delta Plan clarified that the numeric objectives are not just applicable at the compliance monitoring locations, but "unless otherwise indicated, water quality objectives cited for a general area, such as for the southern Delta, are applicable for all locations in that general area and compliance locations will be used to determine compliance with the cited objectives." The West Canal compliance location is in the general area of the Discovery Bay discharge, and the compliance location is "downstream" of the Discovery Bay discharge during critical Delta flow conditions. Therefore, the numeric electrical conductivity and chloride objectives for the West Canal compliance location is applicable to the receiving waters into which Discovery Bay discharges.

- i. **Chloride.** The Bay-Delta Plan objective for the West Canal at Mouth of Clifton Court Forebay (the entrance to the State Water Project canal) is included in this Order. The maximum mean daily value shall not exceed 250 mg/L to protect Municipal and Industrial uses of the receiving water.

Chloride concentrations in the effluent ranged from 277 mg/L to 400 mg/L, with an average of 330 mg/L, for 104 samples collected by the Discharger from 1/14/04 through 10/10/07. The maximum background concentration of chloride in Old River upstream of the discharge was 164 mg/L.

- ii. **Electrical Conductivity (EC).** The Basin Plan objective for the West Canal at Mouth of Clifton Court Forebay (the entrance to the State Water Project canal) is included in this Order. The maximum monthly average of daily mean values shall not exceed 1000 $\mu\text{mhos/cm}$ to protect Agricultural uses of the receiving water.

A review of the Discharger's monitoring reports from 1/14/04 through 10/10/07 shows an average effluent EC of 1921 $\mu\text{mhos/cm}$, with a range of 724 to 2280 $\mu\text{mhos/cm}$ for 91 samples. The maximum background EC level in the receiving water upstream from the discharge was 735 $\mu\text{mhos/cm}$. The EC of the effluent, receiving water and source water all exceed the mos water quality objective at the entrance to the State Water Project (1000 $\mu\text{mhos/cm}$). However, the EC of the wastewater effluent is often at least 500 $\mu\text{mhos/cm}$ above that of the source water. These data show that the receiving water frequently has no assimilative capacity for EC, and that the discharge likely contains controllable salt sources.

- iii. **Total Dissolved Solids (TDS).** The secondary MCL for TDS is 500 mg/L as a recommended level, 1000 mg/L as an upper level, and 1500 mg/L as a short-term maximum.

The average TDS effluent concentration was 1114 mg/L and a ranged from 80 mg/L to 1440 mg/L for 91 samples collected by the Discharger from 1/14/04 through 10/10/07. The maximum effluent TDS concentration exceeds all but the least stringent TDS water quality objective to protect MUN use. The maximum background receiving water concentration of TDS upstream of the discharge was 435 mg/L, so there is assimilative capacity in the receiving water to protect the MUN use. The range of source water concentrations of TDS was 540 – 580 mg/L. The wastewater effluent concentrations were often at least 500 mg/L greater than the source water concentrations, indicating that the discharge contains controllable sources of salts. It is generally not necessary to prescribe effluent limits for every salinity species if one salinity constituent is being regulated. This Permit establishes limits for, electrical conductivity adequate to regulate salinity issues. Therefore an effluent limitation for TDS is not necessary to protect water quality and is therefore not prescribed.

- iv. **Salinity Effluent Limitations.** Effluent limitations based on the MCL, the agricultural water quality goal, or the Basin Plan would likely require construction and operation of a reverse osmosis treatment plant. The State Water Board, in Water Quality Order 2005-005 (for the City of Manteca), states, "*...the State Board takes official notice [pursuant to Title 23 of California Code of Regulations, Section 648.2] of the fact that operation of a large-scale reverse osmosis treatment plant would result in production of highly saline brine for which an acceptable method of disposal would have to be developed. Consequently, any decision that would require use of reverse osmosis to treat the City's municipal wastewater effluent on a large scale should involve thorough consideration of the expected environmental effects.*" The State Water Board states in that Order, "*Although the ultimate solution to southern Delta salinity problems have not yet been determined, previous actions establish that the State Board intended for permit limitations to play a limited role with respect to achieving compliance with the EC water quality objectives in the southern Delta.*" The State Water Board goes on to say, "*Construction and operation of reverse osmosis facilities to treat discharges...prior to implementation of other measures to reduce the salt load in the southern Delta, would not be a reasonable approach.*" In addition, the State Water Board expressed concerns about costs of reverse osmosis; the same considerations apply to this Facility.

The Regional Water Board, with cooperation of the State Water Board, has begun the process to develop a new policy for the regulation of salinity in the Central Valley. In a statement issued at the 16 March 2006, Regional Water Board meeting, Board Member Dr. Karl Longley recommended that the Regional Water Board continue to exercise its authority to regulate

discharges of salt to minimize salinity increases within the Central Valley. Dr. Longley stated, *"The process of developing new salinity control policies does not, therefore, mean that we should stop regulation salt discharges until a possible interim approaches to continue controlling and regulating salts in a reasonable manner, and encourage all stakeholder groups that may be affected by the Regional Board's policy to actively participate in policy development."*

As previously described, effluent data for EC, chloride, and TDS indicate that effluent concentrations continue to be at levels of concern that may affect beneficial uses of the Old River. Therefore, this Order includes an annual average performance-based effluent limitation of 2100 $\mu\text{mhos/cm}$ for EC to protect the receiving water from further salinity degradation, based on the highest annual average effluent concentration. However, should the Discharger fail to implement the provisional requirements specified in Provision VI.C.3.c of this Order, then this Order requires the Discharger to comply with the monthly average EC effluent limits of 1000 $\mu\text{mhos/cm}$, which are based on the Bay-Delta Plan water quality objectives for this geographical location. The Bay-Delta objectives are under review, but when or if the salinity objectives will be changed is unknown. The Regional Water Board must implement water quality objectives as they exist at this time.

Compliance with these effluent limitations and the requirements of Provision VI.C.3.a will result in a salinity reduction in the effluent discharged to the receiving water; however, the discharge may cause or contribute to an exceedance of a water quality objective for salinity until adequate measures are implemented to meet those objectives.

EC is an indicator parameter for salinity, as is chloride and TDS. Establishing an effluent limitation for EC is expected to effectively control the constituents that contribute to salinity, including TDS and chloride. Therefore, the effluent limits for chloride and TDS were not carried forward from the previous Order. Removal of the effluent limitations is consistent with the antibacksliding regulations, because this Order includes controls for effluent salinity. The removal of the effluent limitations also meets state and federal antidegradation requirements, because even the performance-based effluent EC limitation (2,100 $\mu\text{mhos/cm}$) is more stringent than the previous Order, which will result in lower concentrations of chloride and TDS in the discharge. Monitoring of these constituents has been required to verify that they are effectively controlled using EC as an indicator parameter.

- o. Settleable Solids.** For inland surface waters, the Basin Plan states that "[w]ater shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses." No detectable Settleable Solids were found in the 93 samples analyzed in the period. There is no reasonable potential for causing or contributing to violation of

the Basin Plan objective, so no Settleable Solids effluent limitation is included in this permit.

- p. Temperature.** The Thermal Plan requires that, "The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F", and "No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving water." Therefore, to ensure compliance with the Thermal Plan, an effluent limitation for temperature is included in this Order.
- q. Toxicity.** See Section IV.C.5. of the Fact Sheet regarding whole effluent toxicity.

4. WQBEL Calculations

- a. Effluent limitations for ammonia and copper were calculated in accordance with section 1.4 of the SIP. The following paragraphs describe the methodology used for calculating effluent limitations.
- b. **Effluent Limitation Calculations.** In calculating maximum effluent limitations, the effluent concentration allowances were set equal to the criteria/standards/objectives.

$$ECA_{acute} = CMC \qquad ECA_{chronic} = CCC$$

For the human health, agriculture, or other long-term criterion/objective, a dilution credit can be applied. The ECA is calculated as follows:

$$ECA_{HH} = HH + D(HH - B)$$

where:

ECA_{acute} = effluent concentration allowance for acute (one-hour average) toxicity criterion

$ECA_{chronic}$ = effluent concentration allowance for chronic (four-day average) toxicity criterion

ECA_{HH} = effluent concentration allowance for human health, agriculture, or other long-term criterion/objective

CMC = criteria maximum concentration (one-hour average)

CCC = criteria continuous concentration (four-day average, unless otherwise noted)

HH = human health, agriculture, or other long-term criterion/objective

D = dilution credit

B = maximum receiving water concentration

Acute and chronic toxicity ECAs were then converted to equivalent long-term averages (LTA) using statistical multipliers and the lowest is used. Additional statistical multipliers were then used to calculate the maximum daily effluent limitation (MDEL) and the average monthly effluent limitation (AMEL).

Human health ECAs are set equal to the AMEL and a statistical multiplier is used to calculate the MDEL.

$$\begin{aligned}
 & \text{AMEL} = \text{mult}_{\text{AMEL}} \left[\min \left(\overbrace{M_A ECA_{\text{acute}}, M_C ECA_{\text{chronic}}}^{\text{LTA}_{\text{acute}}} \right) \right] \\
 & \text{MDEL} = \text{mult}_{\text{MDEL}} \left[\min \left(M_A ECA_{\text{acute}}, \underbrace{M_C ECA_{\text{chronic}}}_{\text{LTA}_{\text{chronic}}} \right) \right] \\
 & \text{MDEL}_{\text{HH}} = \left(\frac{\text{mult}_{\text{MDEL}}}{\text{mult}_{\text{AMEL}}} \right) \text{AMEL}_{\text{HH}}
 \end{aligned}$$

where: $\text{mult}_{\text{AMEL}}$ = statistical multiplier converting minimum LTA to AMEL
 $\text{mult}_{\text{MDEL}}$ = statistical multiplier converting minimum LTA to MDEL
 M_A = statistical multiplier converting CMC to LTA
 M_C = statistical multiplier converting CCC to LTA

Water quality-based effluent limitations were calculated for ammonia and copper, as follows in Tables F-6 through F-10, below.

Table F-5. WQBEL Calculations for Ammonia

	Acute	Chronic
pH ⁽¹⁾	8.5	7.8
Temperature °C ⁽²⁾	N/A	26.6
Criteria (mg/L) ⁽³⁾	2.14	1.46
Dilution Credit	13.2	23
ECA	30.4	28
ECA Multiplier	0.13	0.52
LTA ⁽⁴⁾	3.95	14.58
AMEL Multiplier (95 th %)	2.56	⁽⁵⁾
AMEL (mg/L)	10.1	⁽⁵⁾
MDEL Multiplier (99 th %)	7.59	⁽⁵⁾
MDEL (mg/L)	30	⁽⁵⁾

- (1) Acute design pH = 8.5 (max. allowed effluent pH), Chronic design pH = median receiving stream pH
- (2) Temperature = Maximum 30-day average seasonal effluent temperature
- (3) USEPA Ambient Water Quality Criteria
- (4) LTA developed based on Acute and Chronic ECA Multipliers calculated at 99th percentile level per sections 5.4.1 and 5.5.4 of TSD.
- (5) Limitations based on acute LTA ($\text{LTA}_{\text{chronic}} > \text{LTA}_{\text{acute}}$)

Table F-6. WQBEL Calculations for Copper

	Acute - CTR	Chronic - CTR	Basin Plan
Criteria, dissolved (µg/L) ⁽¹⁾	27.4	17.2	10.0
Dilution Credit	13.2	23	23
Translator ⁽²⁾	0.96	0.96	0.96
ECA, total recoverable ⁽³⁾	323	297	135
ECA Multiplier ⁽⁴⁾	0.36	0.57	---
LTA	117	169	---
AMEL Multiplier (95 th %) ⁽⁵⁾⁽⁶⁾	1.47	⁽⁸⁾	---
AMEL (µg/L)	172	⁽⁹⁾	---
MDEL Multiplier (99 th %) ⁽⁷⁾	2.77	⁽⁸⁾	---
MDEL (µg/L)	323⁽⁹⁾	⁽⁸⁾	135

- (1) CTR aquatic life criteria, based on an effluent hardness of 204 mg/L as CaCO₃.
- (2) EPA Translator used as default.
- (3) ECA calculated per section 1.4.B, Step 2 of SIP. This allows for the consideration of dilution.
- (4) Acute and Chronic ECA Multiplier calculated at 99th percentile per section 1.4.B, Step 3 of SIP or per sections 5.4.1 and 5.5.4 of the TSD.
- (5) Assumes sampling frequency n=>4.
- (6) The probability basis for AMEL is 95th percentile per section 1.4.B, Step 5 of SIP or section 5.5.4 of the TSD.
- (7) The probability basis for MDEL is 99th percentile per section 1.4.B, Step 5 of SIP or section 5.5.4 of the TSD.
- (8) Limitations based on acute LTA (Acute LTA < Chronic LTA)
- (9) MDEL exceeds Basin Plan site-specific objective for copper (10.4 µg/L), final effluent limitations implement the Basin Plan site-specific objective.

Table F-7. Summary of Final Water Quality-based Effluent Limitations

Parameter	Units	Effluent Limitations		
		Average Monthly	Maximum Daily	Annual Average
Ammonia	mg/L	10	30	--
	lbs/day	177	525	--
Copper	µg/L	50	70	--
Iron	µg/L	---	---	300
Aluminum	µg/L	---	---	200
Nitrate (as N)	mg/L	73	126	---
Electrical Conductivity	µmhos/cm	1000	---	---

5. Whole Effluent Toxicity (WET)

For compliance with the Basin Plan's narrative toxicity objective, this Order requires the Discharger to conduct whole effluent toxicity testing for acute and chronic toxicity, as specified in the Monitoring and Reporting Program (Attachment E, Section V.). This Order also contains effluent limitations for acute toxicity and requires the Discharger to implement best management practices to investigate the causes of, and identify corrective actions to reduce or eliminate effluent toxicity.

a. Acute Aquatic Toxicity. The Basin Plan contains a narrative toxicity objective that states, "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life." (Basin Plan at III-8.00) The Basin Plan also states that, "...effluent limits based upon acute biotoxicity tests of effluents will be prescribed where appropriate..." USEPA Region 9 provided guidance for the development of acute toxicity effluent limitations in the absence of numeric water quality objectives for toxicity in its document titled "Guidance for NPDES Permit Issuance", dated February 1994. In section B.2., *Toxicity Requirements* (pgs. 14-15), it states that, "In the absence of specific numeric water quality objectives for acute and chronic toxicity, the narrative criterion 'no toxics in toxic amounts' applies. Achievement of the narrative criterion, as applied herein, means that ambient waters shall not demonstrate for acute toxicity: 1) less than 90% survival, 50% of the time, based on the monthly median, or 2) less than 70% survival, 10% of the time, based on any monthly median. For chronic toxicity, ambient waters shall not demonstrate a test result of greater than 1 TUc." Accordingly, effluent limitations for acute toxicity have been included in this Order as follows:

Acute Toxicity. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

Minimum for any one bioassays ----- 70%
 Median for any three or more consecutive bioassays ----- 90%

b. Chronic Aquatic Toxicity. Based on quarterly whole effluent chronic toxicity testing performed by the Discharger from January 2004 through July 2007, the discharge does not have reasonable potential to cause or contribute to an in-stream excursion above of the Basin Plan's narrative toxicity objective.

During the term of the previous Order, the chronic toxicity "trigger" was 1 chronic toxicity unit (TUc). Exceedances of this trigger during the term of the previous Order are described by the following table:

Table F-8. Chronic Toxicity Monitoring Results Exceeding 1 TUc (2004-2007)

Date	Test Species	Result (TUc)
April 2005	<i>Selenastrum</i> algae	4.00
April 2005	<i>Ceriodaphnia dubia</i>	2.00
June 2005	<i>Selenastrum</i> algae	1.33
October 2005	<i>Selenastrum</i> algae	4.00
January 2006	<i>Selenastrum</i> algae	4.00
October 2006	<i>Selenastrum</i> algae	2.00
January 2007	<i>Selenastrum</i> algae	8.00
May 2007	<i>Selenastrum</i> algae	1.33
July 2007	<i>Selenastrum</i> algae	2.00

The Discharger conducted a dilution study during this time period, and determined that the worst case chronic dilution ratio for discharge into Old River is 23:1. Based on prior sampling results, the Discharger should not cause chronic toxicity in Old River at a dilution of 23:1, so there is no reasonable potential for chronic toxicity. Therefore, no effluent limitation for chronic toxicity is included in the permit. The current Order also establishes the requirement for a Toxicity Reduction Evaluation, as further described below, should chronic toxicity monitoring results exceed a trigger value of 10 TUc. Based upon the above data, the Discharger can meet a 10 TUc trigger, and exceedance of 10 TUcs would indicate an increase in effluent toxicity that should be evaluated.

To ensure compliance with the Basin Plan's narrative toxicity objective, the Discharger is required to conduct chronic whole effluent toxicity testing, as specified in the Monitoring and Reporting Program (Attachment E, Section V.). Furthermore, Special Provisions VI.C.2.a. of this Order requires the Discharger to investigate the causes of, and identify and implement corrective actions to reduce or eliminate effluent toxicity. If the discharge demonstrates a pattern of toxicity exceeding the numeric toxicity monitoring trigger, the Discharger is required to initiate a Toxicity Reduction Evaluation (TRE), in accordance with an approved TRE work plan. The numeric toxicity monitoring trigger is not an effluent limitation; it is the toxicity threshold at which the Discharger is required to perform accelerated chronic toxicity monitoring, as well as, the threshold to initiate a TRE if a pattern of effluent toxicity has been demonstrated.

D. Final Effluent Limitations

1. Mass-based Effluent Limitations.

Title 40 CFR 122.45(f)(1) requires effluent limitations be expressed in terms of mass, with some exceptions, and 40 CFR 122.45(f)(2) allows pollutants that are limited in terms of mass to additionally be limited in terms of other units of measurement. This Order includes effluent limitations expressed in terms of mass and concentration. In addition, pursuant to the exceptions to mass limitations provided in 40 CFR 122.45(f)(1), some effluent limitations are not expressed in terms of mass, such as pH and temperature, and when the applicable standards are expressed in terms of concentration (e.g. CTR criteria and MCLs) and mass limitations are not necessary to protect the beneficial uses of the receiving water.

Mass-based effluent limitations were calculated based upon the permitted average daily discharge flow allowed in Section IV.A.1.a.(5) of the Limitations and Discharge Requirements.

2. Averaging Periods for Effluent Limitations.

Title 40 CFR 122.45 (d) requires average weekly and average monthly discharge limitations for publicly owned treatment works (POTWs) unless impracticable. However, for toxic pollutants and pollutant parameters in water quality permitting, the USEPA recommends the use of a maximum daily effluent limitation in lieu of

average weekly effluent limitations for two reasons. "First, the basis for the 7-day average for POTWs derives from the secondary treatment requirements. This basis is not related to the need for assuring achievement of water quality standards. Second, a 7-day average, which could comprise up to seven or more daily samples, could average out peak toxic concentrations and therefore the discharge's potential for causing acute toxic effects would be missed." (TSD, pg. 96) This Order utilizes maximum daily effluent limitations in lieu of average weekly effluent limitations for settleable solids, ammonia, copper, nitrate, and Electrical Conductivity for the achievement of water quality standards and for the protection of the beneficial uses of the receiving stream. Furthermore, for BOD, TSS, and pH, weekly average effluent limitations have been replaced or supplemented with effluent limitations utilizing shorter averaging periods. The rationale for using shorter averaging periods for these constituents is discussed in Attachment F, Section IV.C.3., above.

3. Satisfaction of Anti-Backsliding Requirements.

The Clean Water Act specifies that a revised permit may not include effluent limitations that are less stringent than the previous permit unless a less stringent limitation is justified based on exceptions to the anti-backsliding provisions contained in Clean Water Act sections 402(o) or 303(d)(4), or, where applicable, 40 CFR 122.44(f).

Some effluent limitations in this Order are less stringent than those in the previous Order. As discussed below this relaxation of effluent limitations is consistent with the anti-backsliding requirements of the CWA and federal regulations.

In the previous permit, Order No. R5-2003-0067, ambient water quality criteria for ammonia and copper were expressed as "floating" limitations. In this current Order, the fixed effluent limitations for ammonia and copper are less stringent than the effluent limitations of the previous Order because they account for dilution. Anti-backsliding requirements are satisfied, however, pursuant to CWA section 402(o)(2)(B), where the documentation of an actual dilution factor for the receiving water determined during the term of the previous permit, qualifies as new information which was not available at the issuance of the previous permit.

The changes in effluent limits for ammonia and copper in the current permit are based on new information generated during the term of the previous permit, and are consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16, as described below.

The previous permit contained effluent limitations for turbidity. The prior limitations were solely an operational check to ensure the treatment system was functioning properly and could meet the limits for solids and coliform. The prior effluent limitations were not intended to regulate turbidity in the receiving water. Rather, turbidity is an operational parameter to determine proper system functioning and not a water quality based limitation.

The revised Order contains performance based operational turbidity specifications to be met prior to disinfection in lieu of effluent limitations. The revised Order does not include effluent limitations for turbidity. However, the performance-based specification in this Order is an equivalent limit that is not less stringent, and therefore does not constitute backsliding.

The proposed revised operational specifications for turbidity are the same as the effluent limitations in the previous permit, with the inclusion of a more stringent requirement for an instantaneous maximum limit at any time. (See Special Provisions C.5. Ultraviolet Disinfection (UV) System Operating Specifications for turbidity specifications.) The proposed revised permit moves the point of compliance from the final effluent after disinfection to an internal compliance point prior to disinfection. These revisions are consistent with state regulations implementing recycled water requirements.

The revision in the turbidity limitation is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16 because this Order imposes equivalent or more stringent requirements than the prior permit and therefore does not allow degradation.

The previous permit contained effluent limitations for aluminum, total residual chlorine, chloroform, cyanide, dibromochloromethane, dichlorobromomethane, lead, mercury, MTBE, MBAS, and zinc. Effluent limitations for these parameters are not contained in the current permit. The Discharger has modified their disinfection system to eliminate the use of chlorine and has changed the discharge location to the Old River.

The deletion of effluent limits for aluminum, total residual chlorine, chloroform, cyanide, dibromochloromethane, dichlorobromomethane, lead, mercury, MTBE, MBAS, and zinc in the current permit are based on new information generated during the term of the previous permit, and are consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16

The previous permit contained effluent limitations for chloride and TDS. EC is an indicator parameter for salinity, as is chloride and TDS. Establishing an effluent limitation for EC is expected to effectively control the constituents that contribute to salinity, including TDS and chloride. Therefore, the effluent limits for chloride and TDS were not carried forward from the previous permit. Removal of the effluent limitations is consistent with the antibacksliding regulations, because this Order includes controls for effluent salinity. The removal of the effluent limitations also meets state and federal antidegradation requirements, because the effluent EC limitations are more stringent than the previous permit, which will result in lower concentrations of chloride and TDS in the discharge. Monitoring of these constituents has been required to verify that they are effectively controlled using EC as an indicator parameter.

4. Satisfaction of Antidegradation Policy

a. **Surface Water.** In accordance with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution 68-16, the water quality of Old River shall be maintained, unless the Regional Water Board finds:

1. That allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located,
2. That applicable water quality criteria and objectives shall be achieved,
3. That existing beneficial uses of the receiving water will be fully protected, and
4. That the highest statutory and regulatory requirements for point source discharges to the receiving water are being achieved; and that all cost-effective and reasonable best management practices for non-point source discharges to the receiving water are being achieved.

This permit does not authorize increased concentrations or loadings of pollutants in the discharge, except for ammonia. Because the discharge complies with each exception above, the increase of ammonia concentrations in the discharge above that of the previous permit satisfies antidegradation requirements. The Regional Water Board finds that the necessity for a wastewater treatment plant for the community allows for lowering receiving water quality as a result of the increased ammonia concentration in the discharge. Secondly, the applicable receiving water criteria and objectives will be achieved, and beneficial uses will be protected. The dilution study conducted during the term of the previous permit demonstrated that granting a dilution credit is appropriate and that the existing beneficial uses of Old River will be fully protected upon the application of the dilution credit. Finally, the Regional Water Board applies the highest statutory and regulatory requirements upon point source dischargers to Old River, and reasonable BMPs are being applied to non-point discharges to the receiving water.

b. **Groundwater.** The Discharger utilizes sludge disposal lagoons, lined with clay liners. Domestic wastewater contains constituents such as total dissolved solids (TDS), specific conductivity, pathogens, and nitrates. Percolation from the lagoons may result in an increase in the concentration of these constituents in groundwater. The increase in the concentration of these constituents in groundwater must be consistent with Resolution 68-16. The Discharger is required to continue its groundwater monitoring study to comply with the receiving groundwater limits which state that the discharge shall not impact beneficial uses, or cause total coliform bacteria to exceed 2.2 MPN/100 mL over any seven day period. Any increase in pollutant concentrations in groundwater must be shown to be necessary to allow wastewater utility service necessary to accommodate housing and economic expansion in the area and must be consistent with maximum benefit to the people of the State of California. Some degradation of groundwater by the Discharger is consistent with Resolution 68-