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 the Feather River downstream of the discharge are municipal and domestic supply; agricultural supply; water contact recreation; including canoeing and rafting; non-contact water recreation; including aesthetic enjoyment; warm freshwater habitat; cold freshwater habitat; warm migration of aquatic organisms; cold migration of aquatic organisms; warm spawning, reproduction, and/or early development; cold spawning, reproduction, and /or early development; and wildlife habitat.

   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 §§131.2 and 131.10, require that all waters of the State 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 28 November 1975, whether or not they are included in the water quality standards. Federal Regulation, 40 CFR §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. **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. The Discharger submitted an Antidegradation Analysis Report, as discussed in detail in Section IV.D.4. of this Fact Sheet. Regional Water

Board staff finds that the discharge as regulated by this Order is consistent with the federal and State antidegradation policies.

3. **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 the Anti-Backsliding requirements is discussed in Section IV.D.3.

4. **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) (EPCRKA) 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 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 EPCRKA cannot be conducted. Based on information from EPCRKA, 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.

5. **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. According to the Report of Waste Discharge, the Discharger is covered under the State Water Board General Permit for Discharges of Storm Water Associated with Industrial Activities (Industrial General Permit No. CA5000001).

6. **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 30 November 2006 USEPA gave final approval to California's 2006 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.*" The 2006 303(d) list for the Feather River (Lower, Lake Oroville Dam to Confluence with Sacramento River) includes: chlorpyrifos, 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. TMDLs for chlorpyrifos, group A pesticides, mercury, and unknown toxicity have not yet been developed. The proposed completion dates for these pollutants is 2009 (mercury), 2011 (group A pesticides) and 2019 (chlorpyrifos and unknown toxicity).

   In 2003, the Central Valley Water Board adopted Resolution R5-2003-0148, which approved a Basin Plan Amendment establishing TMDLs and implementation plans for diazinon in the Sacramento and Feather Rivers. The Basin Plan includes, in Table III-2A, specific water quality objectives for diazinon that apply in the Feather River (from the Fish Barrier Dam to the Sacramento River). According to the implementation plan for the TMDL, the waste load allocations for all NPDES permitted discharges are the diazinon water quality objectives. These objectives were used as the basis for water quality-based effluent limitations for diazinon in this Order (see Section IV.C.3 below). Compliance with water quality objectives, waste load allocations, and load allocations for diazinon in the Sacramento and Feather Rivers is required by 30 June 2008.

   The Regional Water Board has recently (March 2007) prepared proposed Basin Plan amendments to revise the diazinon and chlorpyrifos numeric water quality objectives, and TMDL waste load allocations for point sources and load allocations for non-point sources. The Basin Plan amendment was adopted by the Central Valley Regional Board on 3 May 2007. The proposed change for diazinon would

increase the current objective to approximately twice the existing objective. The change to the diazinon water quality objective is required to address new information made available since the existing water quality objective was adopted. Current data indicates that the Feather River appear to be meeting the proposed water quality objectives, and the Regional Water Board believes that the loading capacity should be met by the time the Basin Plan Amendment is approved by the USEPA. Therefore, the compliance date for both diazinon and chlorpyrifos is proposed to be the effective date of the Basin Plan Amendment. This permit contains a reopener to allow reevaluation of diazinon effluent limitations upon USEPA approval of the Basin Plan amendment.

E. Other Plans, Polices 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:

   a. The waste consists primarily of domestic sewage and treated effluent;

   b. The waste discharge requirements are consistent with water quality objectives; and

   c. The treatment and storage facilities described herein are associated with a municipal wastewater treatment plant.

2. 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 §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-17.00, 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) USEPA'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 most stringent objective 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

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 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH.

1. Applicable Technology-Based Effluent Limitations

a. **BOD_5 and TSS.** Federal Regulations, 40 CFR Part 133, establish the minimum weekly and monthly average level of effluent quality attainable by secondary treatment for BOD_5 and TSS. A daily maximum effluent limitation of 60 mg/L for BOD_5 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. These daily maximum effluent limitations were included in the previous Order, and are being carried forward to this Order. 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 BOD_5 and TSS over each calendar month.

b. **pH.** The secondary treatment regulations at 40 CFR Part 133 also require that pH be maintained between 6.0 and 9.0 standard units.

c. **Application of Technology-Based Effluent Limitations.** The federal regulations at 40 CFR §122.41(e) requires the proper operation and maintenance of treatment and control systems at all times. As described previously, discharges from the Facility can either be directed to the Feather River or one of six disposal ponds. The disposal ponds could potentially discharge directly into the Feather River when inundated during high river flows (see Section IV.C.3.f below for further discussion related to application of effluent limitations for discharges into the disposal ponds). Further, the State Water Board Order WQO 2004-0013 states that the disposal ponds represent point source discharges to the Feather River. Therefore, to ensure compliance with applicable technology-based effluent

limitations for point source discharges, the effluent limitations for BOD_5, TSS, and pH will be applied to discharges to both the Feather River through Discharge Point No. 001 and discharge into the disposal ponds through Discharge Point No. 002.

d. **Flow.** The Facility was designed to provide a secondary level of treatment for up to a design flow of 10.5 mgd average dry weather flow. The previous Order No. R5-2003-0085 contained a regulated flow of 7.0 mgd. The Discharger requested an increase in regulated flow of up to 10.5 mgd. Therefore, this Order contains an Average Dry Weather Flow effluent limit of 10.5 mgd.

Summary of Technology-based Effluent Limitations
Discharge Point Nos. 001 and 002

Table F-6. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Biochemical Oxygen Demand (BOD) (5-day @ 20 Deg. C)	mg/L	30	45	60	--	--
	lbs/day[1]	2,627	3,941	5,254	--	--
Total Suspended Solids (TSS)	mg/L	30	45	60	--	--
	lbs/day[1]	2,627	3,941	5,254	--	--
BOD and TSS Removal	%	85	--	--	--	--
pH	standard units	--	--	--	6.0	9.0

[1] The mass-based effluent limitations are based on the average dry weather flow effluent limit of 10.5 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 stream is the Feather River, which is a tributary to the Sacramento River. The beneficial uses of the Feather River are summarized in Section III 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*, at (c)(4), states the following:

"Application of metals criteria. (i) *For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, for waters with a hardness of 400 mg/L or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations.*" [emphasis added]

The State Water Board, in footnote 19 to WQO 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.*"

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 conditions at the time of discharge, effluent limitations must be set using the worst-case condition (e.g., lowest ambient hardness) in order to protect beneficial uses for all discharge conditions.

The issue of the appropriate hardness value to use for establishing hardness-based water quality objectives was raised as part of the petition of Order No. R5-2003-0085. Although the State Water Board, in Order WQO 2004-0013, agreed that the numeric value used for calculation of WQBELs was not reliable and should be replaced, it supported the use of a worst-case observed minimum hardness to protect the receiving water under varying hardness conditions.

The Discharger, in Attachment D of its new Report of Waste Discharge, requested the use of hardness values within or at the boundary of mixing zones and at receiving water design flow conditions (i.e., at critical low flows). Considering the State Water Board conclusions regarding which hardness value to use, and the technical argument provided by the Discharger, the Regional Water Board used a reasonable worst case hardness value for calculating applicable water quality objectives. The Regional Water Board has used this approach in other adopted Orders (see for example Order No. R5-2002-0083). In particular, the Regional Water Board agrees with the Discharger that receiving water hardness is generally flow-related; lower receiving water flows yield higher hardness. Based on upstream receiving water data provided by the Discharger for the period January 2002 through January 2007, a reasonable worst case hardness value of 32 mg/L (as $CaCO_3$) was used to derive applicable hardness-dependent water quality objectives. This value from 1 November 2005 represents the lowest reported hardness value in the Feather River upstream of the facility discharge during periods of flow less than the harmonic mean flow of 3,600 cubic feet per second (cfs). A summary of the hardness and flow data

used to determine the reasonable worst-case hardness value is provided in Attachment G.

c. **Assimilative Capacity/Mixing Zone.** The CWA directs states to adopt water quality standards to protect the quality of its waters. USEPA's current water quality standards regulation authorizes states to adopt general policies, such as mixing zones, to implement state water quality standards (40 CFR §122.44 and section 122.45). The USEPA allows states to have broad flexibility in designing its mixing zone policies. Primary policy and guidance on determining mixing zone and dilution credits is provided by the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (State Implementation Policy or SIP) and the Basin Plan. If no procedure applies in the SIP or the Basin Plan, then the Regional Water Board may use the USEPA *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) (TSD).

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

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

Section 1.4.2.1 of the SIP defines a dilution credit as, "a numerical value associated with the mixing zone that accounts for the receiving water entrained

into the discharge. The dilution credit is a value used in the calculation of effluent limitations. Dilution credits may be limited or denied on a pollutant-by-pollutant basis, which may result in a dilution credit for all, some or no priority pollutants in a discharge." Section 1.4.2 of the SIP states that when establishing and determining compliance with effluent limitations for applicable human health, acute or chronic aquatic life priority pollutant criteria/objectives, or the narrative toxicity objective for aquatic life protection contained in a Basin Plan, that the Regional Water Board has the discretion to grant mixing zones and dilution credits on a discharge-by-discharge basis. In granting a mixing zone, the SIP states that a mixing zone shall be as small as practicable, and meet the conditions provided in Section 1.4.2.2 of the SIP.

Regarding, the SIP states, "*A mixing zone shall be as small as practicable. The following conditions must be met in allowing a mixing zone:*

A: A mixing zone shall not:

(1) compromise the integrity of the entire water body;

(2) cause acutely toxic conditions to aquatic life passing through the mixing zone;

(3) restrict the passage of aquatic life;

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

(5) produce undesirable or nuisance aquatic life;

(6) result in floating debris, oil, or scum;

(7) produce objectionable color, odor, taste, or turbidity;

(8) cause objectionable bottom deposits;

(9) cause nuisance;

(10) dominate the receiving water body or overlap a mixing zone from different outfalls; or

(11) be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water. To the extent of any conflict between this determination and the Sources of Drinking Water Policy (Resolution No. 88-63), this SIP supersedes the provisions of that policy."

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

For Order No. R5-2003-0085, the Regional Water Board granted a mixing zone and full and partial dilution credits for chronic aquatic life and human health

criteria for several constituents for which assimilative capacity was available in the Feather River. For several constituents, the Regional Water Board did not grant dilution credits for chronic aquatic life and human health-based criteria based on lack of assimilative capacity. Mixing zones for acute aquatic life were not provided as the Regional Water Board believed that an adequate zone of passage for aquatic life was not available during critical low flows in the Feather River.

The Discharger challenged as part of their petition to the State Water Board the Regional Water Boards decisions regarding mixing zones and dilution credits in Order No. R5-2003-0085. The State Water Board in Order WQO 2004-0013, found that an acute mixing zone should be allowed, but downsized from the one proposed by the City (66.4 to 1). Further, the State Water Board questioned the Regional Water Board's restriction of dilution credits for chronic aquatic life and human health-based criteria based primarily on the lack of rationale provided by the Regional Water Board.

The Facility discharges to the Feather River at Discharge Point No. 001 through a multi-port diffuser. The river is approximately 588 feet wide at the diffuser. At a distance ranging from 160 feet to 320 feet downstream of the diffuser is Shanghai Falls. Several U-shaped portions of the waterfall promote mechanical mixing in addition to the hydraulic jump formed by the river flow over the falls. Additional mixing is provided at higher flows where river flow from a secondary channel joins the flow downstream of the waterfall. At a point approximately 760 feet downstream of the diffuser, the river flow converges through a narrow contraction and then widens downstream from the contraction.

Flows in the Feather River originate in the Sierras and converge in the Lake Oroville Reservoir, located 5 miles northeast of Oroville. From the reservoir, the Feather River flows south across the Sacramento Valley, east of Sutter Buttes past Oroville and Yuba City and Marysville, and joins the Sacramento River from the north. The Yuba River and Bear River are tributary to the Feather River east and south of Yuba City, respectively. Flow in the Feather River at the point of discharge from the Facility is affected by upstream flow in the Feather River, as well as flow in the Yuba River. Due to concerns over low flow conditions that could occur below historical levels in the Feather River at the point of discharge from the Facility, the previous Order required the Discharger to complete a technical report assessing the impact of full utilization of water right withdrawals on critical low flows. The Discharger submitted the report to the Regional Water Board on 5 December 2003. According to the report, the Feather and Yuba Rivers are operated to maintain minimum flow rates regardless of flow diversions. The flow of the Feather River is operated in accordance with a 26 August 1983 agreement between the Department of Water Resources and the California Department of Fish and Game (CDFG) entitled "Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish and Wildlife." This agreement states that a minimum flow of 1,000 cfs must be maintained by releases from the Oroville Reservoir (Thermalito Diversion Dam) along all stretches of the Feather River from the Thermalito Afterbay to the

mouth of the Feather River at Verona. Releases from the reservoir are limited to prevent water elevations in the reservoir to fall below 733 feet. When releases are limited, the Feather River flow could be as low as 750 cfs. The flow in the Yuba River is controlled under the 1 March 2001 State Water Board Decision 1644. Under this decision, flows in the Yuba River are to be maintained at 250 cfs, except under hydrologic critical years, where the flow at Marysville will be 100 cfs.

The Discharger calculated the critical low flows using historical Feather River flow data. The resulting 1Q10 was calculated to be 1,061 cfs; the 7Q10 was calculated to be 1,091 cfs; and the harmonic mean flow was calculated to be 3,600 cfs. During discussions prior to adoption of Order No. No. R5-2003-0085, the Regional Water Board and the Discharger agreed, based on the calculated critical low flows and the minimum flow rates that must be maintained in the Yuba and Feather Rivers, that the 1Q10 and 7Q10 flows would equal 1,000 cfs, and the harmonic mean flow would equal 3,600 cfs.

In its Report of Waste Discharge, the Discharger notified the Regional Water Board that they anticipate adoption by the State Water Board of an updated water management agreement that will affect the critical low flow of the Feather River. In particular, the Lower Yuba River Accord (LYRA), when adopted, will require that operating dam releases result in a minimum increase of 500 cfs in the Lower Yuba River in critical water years. The point of discharge from the Facility is downstream of the confluence between the Feather and Yuba Rivers, so the 1Q10 and 7Q10 critical low flows would increase by 500 cfs when the LYRA is officially adopted by the State Water Board (the 1Q10 and 7Q10 critical low flows would be 1,500 cfs). However, in WQO 2008-0010 the State Water Board determined the LYRA does not support an increase of 500 cfs and that critical low flows could be less than 1,500 cfs. Therefore, the Order No. R5-2007-0134 was remanded back to the Central Valley Board to delete all final effluent limitations based on a critical low flow of 1,500 cfs.

Just prior to adoption of Order No. R5-2003-0085, and in support of its petition of the Order, the Discharger provided a number of technical reports related to evaluation of the mixing zone in the vicinity of the discharge into the Feather River. The Discharger used the Cornell Mixing Zone Expert System (CORMIX) model to model the dilution characteristics of the Facility discharge to the Feather River through the diffuser. The primary studies related to evaluation of the mixing zone for the Facility include:

- Larry Walker Associates, "Yuba City WRP Complete Mix Investigation", Technical Memorandum to Bill Lewis of the Yuba City WRP, March 18, 2003.
- Larry Walker Associates, "River Sampling and CORMIX Validation and Application to the WRP Discharge", Technical Memorandum to Bill Lewis, Jon Bonnet, and Michael Paulucci of the Yuba City WRP, May 7, 2003.
- Larry Walker Associates, "Zone of Passage and Prevention of Acutely Toxic Conditions", Technical Memorandum to Bill Lewis, John Bonnet, and Michael Paulucci of the Yuba City WRP, May 10, 2003.

- Gregory Pasternack, University of California at Davis, "Yuba City WRP Outfall Mixing Zone Study", letter to William Lewis of the City of Yuba City, May 19, 2003.

Due in part to the Regional Water Board's technical review of these studies, the planned increase in capacity at the Facility, and additional data collected subsequent to adoption of Order No. R5-2003-0085, the Discharger submitted a revised mixing zone analysis as part of their new Report of Waste Discharge to be considered for use in this new Order. Particularly in Attachment C, the Discharger presents evidence in support of allowing an acute mixing zone for the Facility discharge to the Feather River. Analyses of the two primary considerations for granting an acute mixing zone (existence of a zone of passage for aquatic organisms around the mixing zone, and prevention of acutely toxic conditions to organisms passing through the plume) were presented.

The USEPA *Technical Support Document for Water Quality-based Toxic Control* (TSD) provides four alternatives for a discharger to demonstrate prevention of lethality to organisms passing through an acute mixing zone:

1. Establish end-of-pipe limits at the criterion maximum concentration (CMC).
2. Design the discharge for high velocity, greater than 3 meters/second, with a mixing zone length no larger than 50-times the discharge length.
3. Show that the most restrictive of the following is met for each outfall:
   a. The CMC is met within 10 percent of the distance from the edge of the outfall structure to the edge of the regulatory mixing zone in any spatial direction.
   b. The CMC is met within a distance of 50-times the discharge length scale in any spatial direction.
   c. The CMC is met within a distance of five times the local water depth in any horizontal direction from any discharge outlet.
4. Show that a drifting organism would not be exposed to 1-hour average concentrations exceeding the CMC.

Alternatives three and four were considered by the Discharger to be most applicable to the Facility discharge and were discussed by the Discharger in Attachment C of their Report of Waste Discharge. The Regional Water Board's review of the updated mixing zone analysis generally found the modeling to be sound because the CORMIX model was validated against field observations. However, several issues were identified that needed to be addressed by the Discharger:

- In reviewing the zone of passage, it is noted that the flow over the diffuser is less than would be estimated by width fraction.
- The river width at the waterfall is less than the width at the diffuser, and so the available zone of passage was reduced.
- There were minor inconsistencies between the original (10 May 2003) analysis and analysis presented with the Report of Waste Discharge.

- The source of the float time was not adequately described.

These comments were provided by the Regional Water Board on 19 January 2007. To address these comments, the Discharger provided "CORMIX Updates for 3-Year Data Window and Future Critical Flows" in a technical memorandum from Larry Walker Associates to Bill Lewis, Maria Solis, and Michael Paulucci of the Yuba City WRP, dated 29 January 2007. The Discharger's responses to the issues raised above are provided below:

- The diffuser is situated on the river right side of the channel which is in general a shallow shelf in comparison to river left which is a deep swift section of the channel carrying a significant portion of the total river flow. Because the diffuser sits in a section of the channel that is relatively shallow, the portion of the total flow passing over the diffuser is less than would be estimated using width fraction. If the channel were more regularly shaped, it would be expected that the portion of the total river flow passing over the diffuser would be proportional to the fraction of the channel width occupied by the diffuser. Note that directly downstream from the diffuser, the waterfall is a vertical cascade, while the river left portion which carries the majority of the flow, the "falls" is a steep chute.
- The proposed mixing zone for the chronic aquatic life criteria does not extend past the edge of the waterfall. For the consideration of the zone of passage, additionally constraining the allowable passage to account for conditions downstream of the waterfall should not be necessary, leaving the original estimates of 80 percent of the flow and 75 percent of the area unaffected by the discharge. However, it is acknowledged that considering the area below the falls was meant to provide a conservative estimate of the zone of passage. Even with the conservative estimate of the constrained zone below the falls, the analysis in the written comments yields approximately two-thirds of the river unaffected by the discharge and available for completely unimpeded passage by aquatic organisms.
- To address the inconsistencies between the original (10 May 2003) mixing zone analysis submittal and the analysis submitted as part of the ROWD, the calculations are clarified below. The difference is due to the original submittal using the 1Q10 of 1,061 cfs calculated from available flowrate data (via USGS DFLOW) and the agreement between the City and the Regional Water Board to use the minimum flow allowable for dam operations, 1,000 cfs. There were also some numbers in the original submittal that were not correctly updated.
- The travel time estimates were calculated by CORMIX. Not discussed in the previous submittals is that the exit velocity from the ports exceeds the river velocity and causes a local acceleration of the river. CORMIX calculates the time required to reach the end of the acceleration zone, and travel times were conservatively estimated by directly proportioning the time required with the fraction of the total acceleration zone distance. For the case of 1Q10 of 1,000 cfs and peak day effluent flowrate of 15.2 mgd, the acceleration zone is approximately 80 feet long and CORMIX calculates the total travel time to be

28 seconds. The conservative estimate of the time required to traverse the 4 feet from the diffuser to the 5 river depths length scale distance would be estimated as 28 sec times (4 divided by 80) which equals 1.4 seconds, and likewise, the distance to reach the end of the zone of initial mixing (8 feet for these conditions) would conservatively require 2.8 seconds. The estimates are conservative because the water velocity closer to the diffuser would be greater. Velocity decreases as momentum dissipates and the plume mixes. However, neglecting the acceleration provided by the momentum of the discharged effluent, the travel time to traverse 8.5 feet is estimated in the comments as 4.5 seconds which is still considerably smaller than the TSD rule of thumb, which is a 15 minute exposure.

- Additionally, the Regional Water Board requested a 3-year data window, spanning July 2003 to July 2006, to select the dataset for use in NPDES permit development. The dilutions submitted as part of the ROWD were, in part, generated based on a 4.5 year data window. The appropriate modifications were made to the CORMIX inputs to reflect a 3-year data window.

Based on its review of the Discharger's response, the Regional Water Board concludes that an adequate zone of passage for aquatic organisms exists and full initial dilution should be allowed for the acute aquatic life criterion applicable to the discharge from the Facility (note that the Regional Water Board had already agreed that dilution can be provided for chronic aquatic life and human health protection criteria).

The dilution credits, based on 40 open ports, for the respective mixing zones are calculated with the CORMIX model[1] using the appropriate river flow rates, and the applicable peaking factors for the effluent flow rates as specified in SIP Table 3. For each mixing zone the downstream distance defining the edge of the specific regulatory mixing zone and the dilution credit are listed in Table F-7.

Table F-7. Regulatory Mixing Zone Sizes and Dilution

Regulatory Mixing Zone	River Flowrate (cfs)	Effluent Flowrate (mgd)	Distance Downstream (feet)	Dilution (D)[(1)]
Acute	1,000	15.2	8[(2)]	11
Chronic	1,000	14.3	160[(3)]	12
Human Health	3,600[(4)]	10.5	1,200	221

(1) Dilutions evaluated at receiving water and effluent flowrates specified in Table 3 of the SIP
(2) Distance to zone of initial dilution at 1Q10 flowrate of 1,000 cfs
(3) Nominal distance from diffuser to lip of Shanghai Falls.
(4) Calculated harmonic mean flowrate.

[1] **Larry Walker Associates, "CORMIX Updates for 3-Year Data Window and Future Critical Flows", Technical Memorandum to Bill Lewis, Maria Solis, and Michael Paulucci of the Yuba City WRP, dated January 29, 2007.**

The mixing zones sizes allocated to the discharge are displayed in Figure F-1, below. The discharge meets the definition of a completely-mixed discharge[2]. To meet the conditions stipulated in the SIP, specifically to not cause acutely toxic conditions to aquatic life passing through the mixing zone, the acute and chronic mixing zones are reduced from the completely-mixed condition. Consistent with the USEPA *Technical Support Document*, the acute mixing zone is limited to the zone of initial dilution where the effluent is vertically mixed through the water column. At the 1Q10 flowrates of 1,000 cfs, the zone of initial dilution is within 8.0 feet of the diffuser based on the initial mixing of the effluent with the receiving water created by the discharge momentum. In Figure F-1, the mixing zone for acute criteria is within the thickness of the line denoting the location of the diffuser. The mixing zone for chronic criteria extends from the diffuser to the lip of Shanghai Falls, denoted on Figure F-1 as a lightly shaded area. After the initial mixing created in most part by the discharge momentum, the mixing is much slower, thus requiring approximately 152 feet to be further diluted from 11:1 to 12:1. The mixing zone for human health criteria extends 1,200 feet which is two river widths downstream where the effluent has been demonstrated to be completely mixed. There are no water intakes within the human health mixing zone. The waterfall providing the energy to completely mix the discharge is within the mixing zone and the two river widths distance downstream is where the Discharger measured the river to be completely mixed. Considering the relatively short distance downstream from the diffuser, the highly turbulent waters up to and immediately downstream of the waterfall, and the lack of water intakes within the area; the mixing zone has not been reduced from the two river widths distance downstream.

[2] **Larry Walker Associates, "Yuba City WRP Complete Mix Investigation", Technical Memorandum to Bill Lewis of the Yuba City WRP, March 18, 2003.**

Figure F-1. Feather River at Shanghai Falls Illustrating the Mixing Zone Sizes

As a result, this Order implements the following dilution factors (D) when calculating WQBELs:

- D = 11 for acute aquatic life criteria
- D = 12 for chronic aquatic life criteria
- D = 221 for human health criteria

As described above, the Discharger notified the Regional Water Board that they anticipate adoption of LYRA by the State Water Board. When adopted, LYRA will increase the 1Q10 and 7Q10 critical low flows by 500 cfs. The dilution factors described above are based on 1Q10 and 7Q10 critical low flows of 1,000 cfs. Because the LYRA adoption is anticipated within the term of this new Order, WQBELs will also be calculated based on dilutions corresponding to critical low flows of 1,500 cfs. The resulting WQBELs will be effective subsequent to State Water Board approval of the LYRA. The corresponding dilution factors that were

used, when appropriate, to reflect increases in the critical low flows are provided below:

- D = 16 for acute aquatic life criteria
- D = 17 for chronic aquatic life criteria
- D = 221 for human health criteria

State Water Board Order WQO 2004-0013 determined that dilution associated with an acute mixing zone to be 12.2 to 1, based on use of the lower design flow (7.0 mgd) from the Facility and assuming assimilative capacity exists. The dilution factors in this Order are consistent with the State Water Board findings. However, with the State Water Board Order WQO 2008-0010 removing the LYRA based limitations, dilution factors will only be based on a 1,000 cfs critical low flow.

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. 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.[3] 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, in this Order the RPA

[3] See, State Water Board Order WQO 2001-16 (Napa) and Order WQO 2004-0013 (Yuba City)

procedures from the SIP were used to evaluate reasonable potential for both CTR and non-CTR constituents.

c. The RPA was based on data from July 2003 through July 2006, which is the range of data the Discharger submitted as part of its Report of Waste Discharge. Additional data outside of this range was also analyzed where there was inadequate data to perform an analysis. This was specifically the situation for receiving water background concentrations for metals, pesticides, and other non-conventional pollutant parameters (e.g., nutrients). The same data set for the receiving water background concentrations were used in developing WQBELs.

   In accordance with the SIP procedures at Section 1.4.3.1, the following values were used for the receiving water background concentrations when calculating WQBELs for the protection of aquatic life criteria and non-carcinogens for human health protection:

   - The maximum receiving water background concentration was used for when there was a value reported above analytical detection levels (either measured or estimated); and
   - The lowest of the individual reported detection limits was used if all samples are reported below the analytical detection limits.

   In accordance with the SIP procedures at Section 1.4.3.2, the following values were used for the receiving water background concentrations when calculating WQBELs for carcinogens for human health protection:

   - The arithmetic mean receiving water background concentration was used when there was a value reported above analytical detection levels (either measured or estimated);
   - The arithmetic mean was calculated using the reported detection limits for samples that were reported below detection; and
   - The lowest of the individual reported detection limits was used if all samples are reported below the analytical detection limits.

   The data set that was used by the Regional Water Board for performing the RPA and calculating WQBELs was compiled based on electronic data provided by the Discharger as part of its Report of Waste Discharge. The data set was then verified by the Regional Water Board against hard-copy laboratory documentation and self-monitoring reports and changes were made when discrepancies were identified. The Regional Water Board provided the final data set to the Discharger for verification of accuracy and concurrence prior to use.

d. WQBELs for most pollutant parameters were calculated in accordance with section 1.4 of the SIP, as described in Attachment F, Section IV.C.4. As is described further below, applicable water quality objectives for pH and total residual chlorine were applied directly to the discharge from the Facility.

The Regional Water Board is applying the secondary maximum contaminant levels (Basin Plan chemical constituents criteria) as annual averages in the total-recoverable form. When developing WQBELs based on secondary maximum contaminant levels, the assimilative capacity is determined using the maximum value of the annual average background concentration for each of the 3 years of data.

Section 1.4 of the SIP allows the use of dynamic models for calculating WQBELs where sufficient effluent and receiving water data exist. As part of its new Report of Waste Discharge, the Discharger submitted the results of a dynamic model that was used to derive WQBELs for ammonia and copper (in its response to the Regional Water Board's comments on the dynamic model, the Discharger also included results for zinc). As described further in Section IV.C.4 below, the Regional Water Board concurs with the dynamic model methodology and results provided by the Discharger, and will base the final WQBELs on the dynamic model.

e. 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 aluminum, ammonia, total residual chlorine, chlorodibromomethane, copper, cyanide, diazinon, dichlorobromomethane, diethyl phthalate, electrical conductivity, iron, lead, manganese, methylene blue active substances, molybdenum, nitrite, pathogens, persistent chlorinated hydrocarbon pesticides, pH, settleable solids, tetrachloroethylene, thallium, and zinc. WQBELs for these constituents are included in this Order. A summary of the reasonable potential analysis (RPA) is provided in Attachment H, and a detailed discussion of the RPA for each constituent is provided below.

   The results of the RPA and preliminary WQBELs were provided by the Regional Water Board to the Discharger and other interested parties on 23 March 2007. Comments were provided by the Discharger on the basis of the effluent limitations established in accordance with secondary maximum contaminant levels (for iron, manganese and aluminum). The Regional Water Board received no other substantive technical comments on the RPA results. Responses to the concerns raised by the Discharger are provided in the detailed discussion of the RPA for each constituent below.

f. As described previously, discharges from the Facility can either be directed to the Feather River or one of six disposal ponds. The disposal ponds could potentially discharge directly into the Feather River when inundated during high river flows (greater than 60,000 cfs which represents a 4- to 5-year storm frequency). Further, the State Water Board Order WQO 2004-0013 states that the disposal ponds represent point source discharges to the Feather River.

Due to concerns over the potential for discharges from the disposal ponds to exceed water quality objectives, the previous Order established effluent limitations for discharges to the Feather River from the disposal ponds. As part of its petition for review of Order No. R5-2003-0085, the Discharger requested that the effluent limitations be deleted due to the infrequent discharge from the ponds, as well as safety issues related to monitoring when discharges do occur. Alternatively, the Discharger requested that dilution credit be provided for the effluent limitations, although the State Water Board determined that the Discharger did not provide adequate technical information to establish a mixing zone and dilution credits for periods of pond inundation and discharge.

For purposes of this Order, the same effluent limitations for all parameters except chlorine residual will be applied to both Discharge Point Nos. 001 (discharge to the Feather River) and 002 (discharge into the disposal ponds). These effluent limitations account for dilution and assimilative capacity as allowed for under the SIP, and should be protective of water quality in the Feather River. Application of effluent limitations into the disposal ponds addresses the Discharger's concern regarding sampling due high river flow events. According to the Discharger, dechlorination does not occur when Facility effluent is directed to the disposal ponds. Because it is expected that chlorine will readily dissipate when discharged to the ponds, the chlorine residual effluent limitations will not be applied to discharges into the disposal ponds.

In Order No. R5-2003-0085 concern was raised that discharges to the disposal ponds may result in magnified concentrations of pollutants via evaporation that when discharged could affect Feather River water quality. As a result, and in addition to the effluent limitations established by in the Order, Order No. R5-2003-0085 required a study and report to determine whether discharges from the disposal ponds are adversely affecting water quality (Provision H.12). If it was determined that discharges from the pond result in an exceedance of water quality objectives, then the Discharger was required to report on means to comply, including if necessary, a pond closure plan. Further, Order No. R5-2003-0085 included a provision (H.1) that stated the..."treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency." The Discharger in its petition to the State Water Board contends that the ponds should be excluded from Provision H.1, as they have been located and operated under waste discharge requirements for many years. In its response in Order WQO 2004-0013, the State Water Board agreed with the Regional Water Board's concerns raised regarding discharges from the ponds, as well as the Discharger's concerns regarding prohibiting inundation and washout of the disposal ponds. The State Water Board concluded that the issue of location and operation of the ponds would be addressed again after completion of the study and report to determine whether discharges from the disposal ponds are adversely affecting water quality. Although a workplan for the disposal pond study was completed and submitted to the Regional Water Board in May 2004 for review and comment, no further action has been taken by the Discharger to complete the study and report. Although Provision H.12 of the previous Order did not require

review and comment by the Regional Water Board of the workplan, the Discharger is awaiting concurrence from the Regional Water Board on the workplan before proceeding with the study. This Order carries over the requirement from the previous Order to complete the disposal pond study.

g. **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, for waters with a pH of 6.5 to 9.0. The Secondary Maximum Contaminant Level – Consumer Acceptance Limit of aluminum is 200 µg/L. USEPA recommends that the ambient criteria are protective of the aquatic beneficial uses of receiving waters in lieu of site-specific criteria. The receiving stream has been measured to have a low hardness—typically between 23 and 52 mg/L as $CaCO_3$.

The MEC for total aluminum was 310 µg/L, based on 30 samples collected between 7 November 2003 and 7 June 2006, while the maximum observed upstream receiving water aluminum concentration was 1300 µg/L, based on 26 samples collected between 7 April 2005 and 24 February 2006. The MEC for dissolved aluminum was 92 µg/L, based on nine samples collected between 7 September 2005 and 7 June 2006, while the maximum observed upstream receiving water aluminum concentration was 42 µg/L, based on 24 samples collected between 7 September 2005 and 24 February 2006. Therefore, aluminum in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a level necessary to protect aquatic life resulting in a violation of the Basin Plan's narrative toxicity objective. Since the receiving water exceeds the acute and chronic toxicity criteria, no assimilative capacity for aluminum is available and a dilution credit cannot be allowed.

In anticipation of difficulty in meeting WQBELs for aluminum based on the NAWQC chronic criterion (i.e., 87 µg.L), the Discharger submitted, as part of its Report of Waste Discharge, an Aluminum Water-Effect Ratio (WER) Work Plan. This work plan describes the results of the Phase I work that was completed in October 2005. The purpose of the Phase I efforts by the Discharger was to establish the protocol for Phase II (which entails the actual performance of the WER study). The Regional Water Board reviewed the Discharger's work plan, and provided comments to the Discharger on 19 January 2007. The major concern in the work plan identified by the Regional Water Board was with the proposed approach in the plan to conduct the laboratory testing in solutions with low pH (~6.5) and hardness (~12 mg/L), particularly for acute toxicity testing. A revised work plan was provided by the Discharger to the Regional Water Board on 1 February 2007. On the whole, the revised work plan provides a WER study design that is consistent with the February 1994 USEPA *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals* (EPA-823-B-94-00) and, if executed properly should yield a defensible WER for aluminum in the Feather River in the vicinity of the Facility discharge. The purpose of the Phase I WER Study for aluminum is to set upper and lower estimated toxicity values in which the Phase II Study can focus. The results of the Phase I Study however

resulted in no observable effects below 8,000 µg/L of aluminum. The Phase I Study was limited to 8,000 µg/L due to aluminum solubility. The result of the Phase I study indicates that the estimated range of aluminum toxicity, if any, is above 8,000 µg/L.

The results of the Phase I WER study were available at the time Order No. R5-2007-0134 was adopted. At that time, the Regional Water Board found that the results of the Phase I WER study alone was not sufficient to discount the NAWQC chronic criterion. Since the adoption of Order No. R5-2007-0134, however, other major dischargers in the Central Valley Region have conducted Phase I and II WER studies for aluminum[4]. Additionally, the National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047) does not support the use of the 87 ug/L criteria when receiving water pH is greater than 7.0 and hardness is greater than 10 mg/L. These additional studies had similar results to the Discharger's Phase I WER study. Therefore, based on this new information provided in these reports, the results of Yuba City's Phase I WER Study estimating aluminum toxicity above 8,000 µg/L has been deemed sufficient to discount the use of the NAWQC chronic criterion of 87 µg/L.

Based on the above information, using the chronic criterion recommended in the NAWQC (87 µg/L), is not appropriate for the receiving water. Therefore, an Average Monthly Effluent Limitations (AMEL) and Maximum Daily Effluent Limitations (MDEL) for aluminum of 432 µg/L and 750 µg/L, respectively, were calculated using the acute criterion recommended in USEPA's NAWQC for the protection of freshwater aquatic life (see Attachment F, Table F-9 for WQBEL calculations). This Order also includes an annual average effluent limitation of 200 µg/L, based on the Secondary MCL, for protection of the MUN beneficial uses. However, as discussed further in Section IV.D.3. of this Fact Sheet, limits should only be as high as is justified under the state and federal antidegradation policies. Order No. R5-2007-0134 contains a interim performance-based MDEL for aluminum of 353 µg/L. The performance based limit is less than the AMEL and MDEL calculated using the acute criterion and can be met by the Discharger; therefore, this order establishes the performance-based MDEL of 353 µg/L as the final aluminum effluent limitation. These effluent limits are applicable to Discharge Point Nos. 001 and 002.

h. In USEPA's *Ambient Water Quality Criteria for Aluminum—1988* [EPA 440/5-86-008], USEPA states that "[a]*cid-soluble aluminum…is probably the best measurement at the present…*"; however, USEPA has not yet approved an acid-soluble test method for aluminum. Replacing the ICP/AES portion of the analytical procedure with ICP/MS would allow lower detection limits to be achieved. Based on USEPA's discussion of aluminum analytical methods, this Order allows the use of the alternate aluminum testing protocol described above to meet monitoring requirements. **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

[4] Phase I and II Aluminum WER studies have been conducted by the City of Manteca (March 2007)

nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. The Discharger does not currently use nitrification to remove ammonia from the waste stream. 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 §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 or CMC) standards based on pH and chronic (30-day average, criteria continuous concentration or CCC) standards based on pH and temperature. USEPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. 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. Because the Feather River has a beneficial use of cold freshwater habitat and the presence of salmonids and early fish life stages in the Feather River is well-documented, the recommended criteria for waters where salmonids and early life stages are present were used.

The maximum permitted effluent pH is 8.5 as the Basin Plan objective for pH in the receiving stream is the range of 6.5 to 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 30-day rolling average temperature and the maximum observed pH of the receiving water were used to calculate the 30-day chronic criteria. The maximum observed 30-day R-1 temperature was 70.7°F (21.5°C), for the rolling 30-day period ending 18 August 2005. The maximum observed R-1 pH value was 8.46 on 5 January 2004. Using a pH value of 8.46 and the worst-case temperature value of 70.7°F (21.5°C) on a rolling 30-day basis, the resulting 30-day CCC is 0.74 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 the 30-day CCC of 0.74 mg/L (as N), the 4-day average concentration that should not be exceeded is 1.85 mg/L (as N).

The MEC for ammonia was 45 mg/L, based on 364 samples collected between 1 July 2003 and 28 June 2006, while the maximum observed upstream receiving water ammonia concentration was 0.11 mg/L, based on 12 samples collected between 24 August 2004 and 5 July 2005. 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 Regional Water Board calculates WQBELs in accordance with SIP procedures for non-CTR constituents, and ammonia is a non-CTR constituent. 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.

An AMEL and MDEL for ammonia of 12.8 mg/L and 26.0 mg/L, respectively, were calculated based on SIP procedures. However, the Discharger submitted dynamic modeling results for ammonia. This Order contains a final AMEL and MDEL for ammonia of 31 mg/L and 60 mg/L, respectively, based on USEPA's *National Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life* and calculated according to the Discharger's dynamic modeling results (discussed further in Section IV.C.4 below). This WQBEL is applicable to Discharge Point Nos. 001 and 002. Based on the sample results for the effluent, it appears the Discharger can meet these new limitations.

i. **Bis (2-ethylhexyl) phthalate.** Bis (2-ethylhexyl) phthalate is used primarily as one of several plasticizers in polyvinyl chloride (PVC) resins for fabricating flexible vinyl products. According to the Consumer Product Safety Commission, USEPA, and the Food and Drug Administration, these PVC resins are used to manufacture many products, including soft squeeze toys, balls, raincoats, adhesives, polymeric coatings, components of paper and paperboard, defoaming agents, animal glue, surface lubricants, and other products that must stay flexible and non-injurious for the lifetime of their use. The State MCL for bis (2-ethylhexyl) phthalate is 4 µg/L and the USEPA MCL is 6 µg/L. The NTR criterion for human health protection for consumption of water and aquatic organisms is 1.8 µg/L and for consumption of aquatic organisms only is 5.9 µg/L.

The MEC for bis (2-ethylhexyl) phthalate was 36 µg/L, based on 29 samples collected between 7 November 2003 and 7 June 2006, while the upstream receiving water bis (2-ethylhexyl) phthalate concentration was not detected in 10 samples collected between 12 October 2004 and 5 July 2005. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the NTR criterion for bis (2-ethylhexyl) phthalate. The arithmetic mean of the receiving water bis (2-ethylhexyl) phthalate concentrations is 0.59 µg/L. The receiving water concentration has not exceeded the criterion; therefore, there is assimilative capacity for bis (2-ethylhexyl) phthalate.

The majority of effluent data provided by the Discharger indicates that bis (2-ethylhexyl) phthalate was below analytical detection levels. Because bis (2-

ethylhexyl) phthalate is a common contaminant of sample containers, sampling apparatus, and analytical equipment, and sources of the detected bis (2-ethylhexyl) phthalate may be from plastics used for sampling or analytical equipment, the Regional Water Board is not establishing effluent limitations for bis (2-ethylhexyl) phthalate at this time. Instead, additional monitoring has been established for bis (2-ethylhexyl) phthalate; if monitoring results from reliable data indicate that the discharge has the reasonable potential to cause or contribute to an exceedance of a water quality standard, then this Order may be reopened and modified by adding an appropriate effluent limitation.

j. **Chloride. (see Subsection below for Salinity)**

k. **Chlorine Residual.** The Discharger uses chlorine for disinfection, which is extremely toxic to aquatic organisms. The Discharger uses sodium bisulfite to dechlorinate the effluent prior to discharge to the Feather River. Due to the existing chlorine use and the potential for chlorine to be discharged, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's narrative toxicity objective.

The USEPA *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) contains statistical methods for converting chronic (4-day) and acute (1-hour) aquatic life criteria to average monthly and maximum daily effluent limitations based on the variability of the existing data and the expected frequency of monitoring. However, because chlorine is an acutely toxic constituent that can and will be monitored continuously, an average 1-hour limitation is considered more appropriate than an average daily limitation. Average 1-hour and 4-day limitations for chlorine, based on these criteria, are included in this Order. Based on evaluation of monitoring data, the Discharger can immediately comply with these new effluent limitations for chlorine residual at Discharge Point No. 001.

The Facility discharges through a diffuser to the Feather River. The chlorine residual limitations required in this Order are protective of aquatic organisms in the undiluted discharge. If compliance is maintained, the Regional Water Board does not anticipate residual chlorine impacts to benthic organisms.

When discharges occur to the disposal ponds through Discharge Point No. 002, it is anticipated that any residual chlorine will dissipate prior to percolation into the ground or overflow into the Feather River. For these reasons, the Regional Water Board does not anticipate residual chlorine impacts to the disposal ponds or Feather River, and therefore will not apply WQBELs for chlorine residual at Discharge Point No. 002.

l. **Chlorodibromomethane.** The CTR includes a chlorodibromomethane criterion of 0.41 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. The MEC for chlorodibromomethane was 0.88 µg/L, based on 28 samples collected between 7 November 2003 and 7 June 2006, while the upstream receiving water

chlorodibromomethane concentration was not detected in 10 samples collected between 17 November 2005 and 19 January 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for chlorodibromomethane.

The ambient monitoring demonstrates the receiving water has assimilative capacity for chlorodibromomethane. A dilution credit for chlorodibromomethane of up to 221:1 can be granted, based on the available human health dilution (see Attachment F, Section IV.C.2.c for a discussion related to available dilution). An AMEL and MDEL for chlorodibromomethane of 76 µg/L and 166 µg/L, respectively, are included in this Order based on the CTR criterion for the protection of human health (see Attachment F, Table F-11 for WQBEL calculations). These WQBELs are applicable to Discharge Point Nos. 001 and 002. Based on the sample results for the effluent, it appears the Discharger can meet these new limitations.

m. **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 reasonable worst-case measured hardness from the effluent and receiving water (32 mg/L as $CaCO_3$) and the USEPA recommended dissolved-to-total translator, the applicable chronic criterion (maximum 4-day average concentration) is 3.52 µg/L and the applicable acute criterion (maximum 1-hour average concentration) is 4.78 µg/L, as total recoverable.

The MEC for total copper was 16 µg/L, based on 30 samples collected between 7 November 2003 and 7 June 2006, while the maximum observed upstream receiving water total copper concentration was 6.5 µg/L, based on 36 samples collected between 24 August 2004 and 24 February 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for copper. An AMEL and MDEL for total copper of 50 µg/L and 85 µg/L, respectively, are included in this Order based on CTR criteria for the protection of freshwater aquatic life and calculated according to the Discharger's dynamic modeling results (discussed further in Section IV.C.4 below). These WQBELs are applicable to Discharge Point Nos. 001 and 002. Based on the sample results for the effluent, it appears the Discharger can meet these new limitations.

n. **Cyanide.** The CTR includes maximum 1-hour average and 4-day average cyanide concentrations of 22 µg/L and 5.2 µg/L, respectively, for the protection of freshwater aquatic life. The MEC for cyanide was 9.4 µg/L, based on 28 samples collected between 7 November 2003 and 7 June 2006, while the maximum observed upstream receiving water cyanide concentration was 3.2 µg/L, based on 10 samples collected between 17 November 2005 and 19 January 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for cyanide.

Because the maximum receiving water concentration is below applicable criteria, assimilative capacity remains in the Feather River and dilution credit can be provided as described in Section IV.C.2.c above. The resulting AMEL and MDEL for cyanide of 24 µg/L and 48 µg/L, respectively, are included in this Order based on CTR criteria for the protection of freshwater aquatic life (see Attachment F, Table F-13 for WQBEL calculations). These WQBELs are applicable to Discharge Point Nos. 001 and 002. Based on the sample results in the effluent, it appears the Discharger can meet these new limitations.

o. **Diazinon.** The Regional Water Board completed a TMDL for diazinon in the Sacramento and Feather Rivers and amended the Basin Plan to include diazinon waste load allocations and water quality objectives on 16 October 2003. The Basin Plan contained water quality objectives for diazinon of 0.080 µg/L as a 1-hour average and 0.050 µg/L as a 4-day average for the Feather River from Fish Barrier Dam to the Sacramento River (see Basin Plan Table III-2A). The Basin Plan also states that "[c]*ompliance with water quality objectives, waste load allocations, and load allocations for diazinon in the Sacramento and Feather Rivers is required by June 30, 2008*" and "[t]*he waste load allocations for all NPDES-permitted discharges are the diazinon water quality objectives.*"

The Regional Water Board adopted a revised Basin Plan amendment on 3 May 2007 with reevaluated water quality objectives for diazinon. The Basin Plan amendment increased the water quality objective for diazinon to 0.16 µg/L and 0.10 µg/L as a 1-hour average and a 4-day average, respectively. The State Water Resources Control Board approved the amendment on 12 May 2008. The USEPA ratified the amendment on 11 August 2008.

The MEC for diazinon was 0.47 µg/L, based on 45 samples collected between 7 November 2003 and 7 June 2006, while the upstream receiving water diazinon concentration was not detected in 10 samples collected between 17 November 2005 and 19 January 2006. Therefore, diazinon in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan objective and waste load allocation. Although the data provided by the Discharger for the receiving water indicates non-detectable amounts of diazinon in the Feather River upstream of the discharge from the Facility, compliance with the TMDL dictates that the water quality objectives be applied as the waste load allocation (i.e., be applied directly to the discharge without any consideration of dilution).

In accordance with the TMDL implementation requirements in the Basin Plan for diazinon, the AMEL and MDEL for diazinon of 0.08 µg/L and 0.16 µg/L, respectively, are included in this Order for Discharge Point Nos. 001 and 002 based on the waste load allocations for the protection of freshwater aquatic life.

The sample results for the effluent indicate that the Discharger will not be able to meet these new limitations. In accordance with the Basin Plan, compliance with the TMDL waste load allocations for diazinon for point source discharges to the Feather River is required by 30 June 2008. Therefore a compliance schedule will

be included in the Order, and an interim performance-based effluent limitation of 0.43 µg/L will be included using the statistical methods for calculating interim effluent limitations described in Attachment F, Section IV.D.1.

p. **Dichlorobromomethane.** The CTR includes a dichlorobromomethane criterion of 0.56 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. The MEC for dichlorobromomethane was 4 µg/L, based on 28 samples collected between 7 November 2003 and 7 June 2006, while the upstream receiving water dichlorobromomethane concentration was not detected in 10 samples collected between 17 November 2005 and 19 January 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for dichlorobromomethane.

The ambient monitoring demonstrates the receiving water has assimilative capacity for dichlorobromomethane. A dilution credit for dichlorobromomethane of up to 221:1 can be granted, based on the available human health dilution (see Attachment F, Section IV.C.2.c above). An AMEL and MDEL for dichlorobromomethane of 111 µg/L and 280 µg/L, respectively, are included in this Order based on the CTR criterion for the protection of human health (see Attachment F, Table F-15 for WQBEL calculations). These WQBELs are applicable to Discharge Point Nos. 001 and 002. Based on the sample results in the effluent, it appears the Discharger can meet these new limitations.

q. **Diethyl Phthalate.** USEPA developed National Recommended Ambient Water Quality Criteria toxicity information for protection of freshwater aquatic life for diethyl phthalate. The acute and chronic lowest observed effect levels for diethyl phthalate are 940 µg/L and 3 µg/L, respectively. The CTR includes a diethyl phthalate criterion of 23,000 µg/L for the protection of human health for waters from which both water and organisms are consumed.

The MEC for diethyl phthalate was 3.7 µg/L, based on 22 samples collected between 14 September 2004 and 7 June 2006, while the maximum observed upstream receiving water diethyl phthalate concentration was 2.2 µg/L, based on 10 samples collected between 12 October 2004 and 5 July 2005. Therefore, diethyl phthalate 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 ambient monitoring demonstrates the receiving water has assimilative capacity for diethyl phthalate. A dilution credit for diethyl phthalate can be granted, based on the available dilution (see Attachment F, Section IV.C.2.c above). An AMEL and MDEL for diethyl phthalate of 10 µg/L and 21 µg/L, respectively, are included in this Order based on the USEPA's National Ambient Water Quality Criteria for the protection of freshwater aquatic life (see Attachment F, Table F-16 for WQBEL calculations). These WQBELs are applicable to Discharge Point Nos. 001 and 002. Based on the sample results in the effluent, it appears the Discharger can meet these new limitations.

r. **Electrical Conductivity. (see Subsection for Salinity)**

s. **Iron.** The Basin Plan water quality objectives for chemical constituents requires that 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) specified in Title 22 of the California Code of Regulations. The Secondary MCL - Consumer Acceptance Limit for iron is 300 µg/L. Based on input from the California Department of Public Health and the fact that secondary MCLs are designed to protect consumer acceptance, effluent limitations based on secondary MCLs are applied as an annual average concentration.

The MEC for total iron was 380 µg/L, based on 38 samples collected between 7 November 2003 and 7 June 2006, while the average observed upstream receiving water iron concentration was 873 µg/L, based on 36 samples collected between 24 August 2004 and 24 February 2006. The MEC for iron as dissolved was 300 µg/L, based on 26 samples collected between 12 October 2004 and 7 June 2006, while the average observed upstream receiving water iron concentration was 190 µg/L, based on 36 samples collected between 24 August 2004 and 24 February 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Secondary MCL for iron. The receiving water has exceeded the Secondary MCL for total iron. Therefore, no assimilative capacity is available in the receiving water for iron. An annual average effluent limitation of 300 µg/L for iron is included in this Order based on protection of the Basin Plan's narrative chemical constituents objective (see Attachment F, Table F-17 for WQBEL calculations).

t. **Lead.** The CTR includes hardness-dependent standards for the protection of freshwater aquatic life for lead. The standards for metals are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for lead in freshwater are 1.46203-[0.145712 x ln(hardness)] for both the acute and the chronic criteria. Using the worst-case measured hardness from the effluent and receiving water (32 mg/L), the applicable chronic criterion (maximum 4-day average concentration) is 0.75 µg/L and the applicable acute criterion (maximum 1-hour average concentration) is 19.14 µg/L, as total recoverable.

The MEC for total lead was 3.3 µg/L, based on 30 samples collected between 7 November 2003 and 7 June 2006, while the maximum observed upstream receiving water total lead concentration was 1 µg/L, based on 10 samples collected between 17 November 2005 and 19 January 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for lead. Because the upstream receiving water concentration exceeds the applicable chronic criterion, no assimilative capacity is available, and no dilution credit will be provided. The Discharger states in a letter to the Regional Board on 1 October 2007 titled "Comments on Tentative Order National Pollution Discharge Elimination System (NPDES) Permit No. CA0079260 – Waste Discharge Requirements for the City of Yuba

City Wastewater Treatment Facility, Sutter County", that data for two of the 10 samples taken in the receiving water are invalid and not representative because they were collected during periods of high receiving water flow, and as a result some assimilative capacity exists for lead in the Feather River. At the time Order No. R5-2007-0134 was adopted the Regional Water Board disagreed with the Discharger based on the fact that the 10 data points for which data were provided only represented 3 consecutive months (November 2005 through January 2006), which did not provide enough data to determine if the data points were representative of the receiving water. Therefore, an AMEL and MDEL for total lead of 0.61µg/L and 1.23 mg/L, respectively, were included were calculated in Order No. R5-2007-0134 based on CTR criteria for the protection of freshwater aquatic life.

The Discharger subsequently submitted dynamic modeling results for lead in an 14 August 2008 letter titled "Submission of Lead Re-Opener Technical Report for Order R5-2007-0134". The Discharger collected 62 Feather River samples from March 2007 to June 2008 and used this data in the dynamic model to produce an AMEL and MDEL for lead of 15.1 µg/L and 18.1 µg/L, respectively, based on the CTR criteria for the Protection of Freshwater Aquatic Life. Furthermore, as discussed in more detail in Section IV.D.3. of this Fact Sheet, limits should only be as high as is justified under the state and federal antidegradation policies. This permit contains effluent limitations that have been revised to comply with the antidegradation policies and are based on performance, not just dynamic modeling results. Specifically, the 99.9th percentile concentration of the effluent data between 7 November 2003 and 4 March 2009 (2.86 µg/L, assuming a log-normal distribution) was used to establish the performance-based effluent limitation for lead. Typically the 99.9th percentile is used as the basis for a performance-based maximum daily effluent limitation. An expanded data set was used to calculate the performance-based limit because the higher percentage of detected values for use in calculating the limit (1 of 30 for 7 November 2003 to 7 June 2006 versus 14 of 56 for 7 November 2003 and 4 March 2009). The maximum effluent concentration is 3.3 µg/L which is greater than the 99.9th percentile (3.2 µg/L) but less than water quality based limits; therefore, the MEC for the expanded data set will be used as the effluent limitation. The Regional Water Board staff is establishing a MDEL of 3.3 µg/L for consistency with the Facility's effluent performance for lead.

u. **Manganese.** The Basin Plan water quality objectives for chemical constituents requires that 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) specified in Title 22 of the California Code of Regulations. The Secondary MCL - Consumer Acceptance Limit for manganese is 50 µg/L. Based on input from the California Department of Health Services and the fact that secondary MCLs are designed to protect consumer acceptance, effluent limitations based on secondary MCLs are applied as an annual average concentration.

The MEC for manganese as total was reported as 460 µg/L, based on 38 samples collected between 7 November 2003 and 7 June 2006, while the average upstream receiving water manganese concentration was 37.1 µg/L, based on 36 samples collected between 24 August 2004 and 24 February 2006. The MEC for manganese as dissolved was reported as 480 µg/L, based on 26 samples collected between 12 October 2004 and 7 June 2006, while the average upstream receiving water manganese concentration was 34 µg/L, based on 36 samples collected between 24 August 2004 and 24 February 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Secondary MCL for manganese.

The ambient monitoring demonstrates the receiving water has assimilative capacity for manganese. A dilution credit for manganese of up to 221:1 can be granted, based on the available human health dilution. If full dilution is provided, the annual average effluent limitation for manganese would be 2,899 µg/L. However, as discussed further in Section IV.D.3. of this Fact Sheet, limits should only be as high as is justified under the state and federal antidegradation policies. This permit contains effluent limitations that have been revised to comply with the antidegradation policies and are based on performance, not just new information about dilution. Specifically, the 95th percentile concentration of the effluent data (186.68 µg/L, assuming a log-normal distribution) was used to establish the performance-based effluent limitation for manganese. Typically the 95th percentile is used as the basis for a monthly average effluent limitation. The Regional Water Board staff is establishing an annual average of 200 µg/L (186.68 µg/L rounded up) for consistency with the effluent limitation for manganese and DPH's recommended application for secondary drinking water standards. This WQBEL is applicable to Discharge Point Nos. 001 and 002.

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

v. **Mercury.** The current USEPA Ambient Water Quality Criteria for Protection of Freshwater Aquatic Life, continuous concentration, for mercury is 0.77 µg/L (30-day average, chronic criteria). The CTR contains a human health criterion (based on a threshold dose level causing neurological effects in infants) of 0.050 µg/L for waters from which both water and aquatic organisms are consumed. Both values are controversial and subject to change. In 40 CFR Part 131, USEPA acknowledges that the human health criteria may not be protective of some aquatic or endangered species and that "*...more stringent mercury limits may be determined and implemented through use of the State's narrative criterion.*" In the CTR, USEPA reserved the mercury criteria for freshwater and aquatic life and may adopt new criteria at a later date.

The maximum observed effluent mercury concentration in the Facility effluent was 0.021 µg/L measured on 7 November 2003. The Sacramento River, to which the Feather River is tributary to, has been listed as an impaired water body pursuant to Section 303(d) of the Clean Water Act because of mercury. Mercury bioaccumulates in fish tissue and, therefore, discharge of mercury to the

receiving water is likely to contribute to exceedances of the narrative toxicity objective and impacts on beneficial uses. Because the Sacramento River has been listed as an impaired water body for mercury, the discharge must not cause or contribute to increased mercury levels. The SIP, Section 1.3, requires the establishment of an effluent limitation for a constituent when the receiving stream background water quality exceeds an applicable criterion or objective.

This Order contains a final performance-based mass effluent limitation of 0.672 lbs/year for mercury for the effluent discharge to the Feather River, a tributary to the Sacramento River. This limitation is based on maintaining the mercury loading at the current level until a total maximum daily load (TMDL) can be established and USEPA develops mercury standards that are protective of human health. The mass limitation was derived using the maximum observed effluent mercury concentration of 0.000021 mg/L) and the average dry weather flow rate of 10.5 mgd as follows:

(0.000021 mg/L) x (10.5 mgd) x (8.34 lbs/day conversion factor) x (365 days) = 0.672 lbs/year

A compliance time schedule has not been included since the maximum effluent concentration is less than the water quality criteria for the receiving water and compliance with the mass limitation can be maintained through implementation measures and/or by limiting new sewer discharges containing mercury concentrations. If USEPA develops new water quality standards for mercury, this permit may be reopened and the effluent limitations adjusted.

w. **Methylene Blue Active Substances (MBAS).** The Basin Plan water quality objectives for chemical constituents requires that 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) specified in Title 22 of the California Code of Regulations. The Secondary MCL - Consumer Acceptance Limit for MBAS is 500 µg/L. Based on input from the California Department of Health Services and the fact that MCLs are designed to protect human health over longer exposure periods, effluent limitations based on MCLs are applied as an annual average concentration.

The MEC for MBAS was 500 µg/L, based on 28 samples collected between 7 November 2003 and 7 June 2006, while the average upstream receiving water MBAS concentration was 48.73 µg/L, based on 11 samples collected between 30 January 2002 and 9 December 2002. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Secondary MCL for MBAS.

The ambient monitoring demonstrates the receiving water has assimilative capacity for MBAS. A dilution credit for of up to 221:1 can be granted, based on the available human health dilution. An annual average effluent limitation of 100 mg/L for MBAS is included in this Order based on protection of the Basin Plan's narrative chemical constituents objective (see Attachment F, Table F-19 for WQBEL calculations). This WQBEL is applicable to Discharge Point Nos. 001

and 002. Based on the sample results in the effluent, it appears the Discharger can meet this new limitation.

x. **Molybdenum.** *Water Quality for Agriculture,* Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985), recommends that the molybdenum concentration in waters used for agricultural irrigation of livestock feed crops not exceed 10 µg/L. Applying the Basin Plan "Policy for Application of Water Quality Objectives", the numeric standard that implements the narrative objective is the Agricultural Water Quality Goal of 10 µg/L.

The MEC for molybdenum was 16 µg/L, based on 31 samples collected between 7 November 2003 and 7 June 2006, while the maximum observed upstream receiving water molybdenum concentration was 1 µg/L, based on 34 samples collected between 24 August 2004 and 24 February 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's chemical constituents objective.

The ambient monitoring demonstrates the receiving water has assimilative capacity for molybdenum. A dilution credit of up to 221:1 can be granted, based on the available human health dilution. However, as discussed further in section IV.D.3. of this Fact Sheet, limits should only be as high as is justified under the state and federal antidegradation policies. This permit contains effluent limits that have been revised to comply with the antidegradation policies and are based on performance, not just new information about dilution. Specifically, the new effluent limitation is a performance limitation and is based on the lognormal distribution of effluent data over the past 3 years. The upper end of the lognormal distribution equates to the average monthly effluent limitation of 32 µg/L. The use of the upper end of the distribution for determining effluent limitations is consistent with both EPA and Regional Water Board approaches for deriving limitations. The new limits will maintain the high quality of the Feather River. This WQBEL is applicable to Discharge Point Nos. 001 and 002. Based on the sample results for the effluent, it appears the Discharger can meet this new limitation.

y. **Nitrite.** 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. Nitrite is 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 that is equal to 1 mg/L (measured as nitrogen), respectively.

USEPA has developed a primary MCL and an MCL goal of 1,000 µg/L for nitrite (as nitrogen).

Inadequate or incomplete denitrification may result in the discharge of 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 MCL for nitrite. Further, the MEC for nitrite was 1,400 µg/L, based on 185 samples collected between 1 July 2003 and 27 June 2006, while the maximum observed upstream receiving water nitrite concentration was not detected in 24 samples collected between 30 January 2002 and 9 December 2002. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's chemical constituents objective.

The ambient monitoring demonstrates the receiving water has assimilative capacity for nitrite. A dilution credit of up to 221:1 can be granted, based on the available human health dilution. An AMEL for nitrite of 221 mg/L is included in this Order based on the MCL (see Attachment F, Table F-20 for WQBEL calculations). This effluent limitation is 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. This WQBEL is applicable to Discharge Point Nos. 001 and 002. Based on the sample results in the effluent, it appears the Discharger can meet this new limitation.

z. **Pathogens**. Municipal and domestic supply, agricultural irrigation, and body contact water recreation are beneficial uses of the receiving stream. 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 Public Health (DPH, formerly Department of Health Services, or DHS) 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.

The critical low flow for the Feather River is 1,000 cfs, and the design effluent flow for the Facility is 16.3 cfs (10.5 mgd average dry weather flow). Therefore, for purposes of applying the DHS guidelines, greater than 20:1 dilution is provided for the wastewater, and the 23 MPN/100 mL and 240 MPN/100 mL limitations are found to be appropriate and included in this Order.

aa. **Persistent Chlorinated Hydrocarbon Pesticides.** Gamma-BHC was detected in the effluent with a concentration as high as 0.053 µg/L. This constituent is a chlorinated hydrocarbon pesticide. The Basin Plan requires that no individual pesticide shall be present in concentrations that adversely affect beneficial uses; discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses; total chlorinated hydrocarbon pesticides shall not be present in the water column at detectable concentrations; and pesticide concentrations shall not exceed those allowable by applicable antidegradation policies. The CTR contains a numeric criterion for gamma-BHC

of 0.019 µg/L, respectively, for freshwaters from which both water and organisms are consumed.

The detection of gamma-BHC at 0.053 µg/L in the effluent presents a reasonable potential to exceed the Basin Plan limitations for chlorinated hydrocarbon pesticides and the CTR criteria for gamma-BHC. In addition to gamma-BHC, chlorinated hydrocarbon pesticides include aldrin, alpha BHC, beta BHC, delta BHC, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, chlordane, dieldrin, endrin, endrin aldehyde, alpha endosulfan, beta endosulfan, endosulfan sulfate, heptachlor, heptachlor epoxide, and toxaphene. WQBELs for persistent chlorinated hydrocarbon pesticides are included in this Order and are based on the Basin Plan objective of no detectable concentrations of chlorinated hydrocarbon pesticides. Since the Basin Plan objective is no detectable concentrations, there can be no assimilative capacity. The limitation for persistent chlorinated hydrocarbon pesticides is included in this Order based on reasonable potential to cause or contribute to an in-stream excursion of the water quality objective. This WQBEL is applicable to Discharge Point Nos. 001 and 002.

Based on the sample results in the effluent, the limitations appear to put the Discharger in immediate non-compliance for gamma-BHC. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. The WQBELs for gamma-BHC (non-detect) are based on a new interpretation of water quality objective. Therefore, a compliance schedule for compliance with the gamma-BHC effluent limitations is established in the Order. To ensure that timely efforts are made by the Discharger to comply with effluent limitations for gamma-BHC, this Order requires preparation of a pollution prevention plan in compliance with CWC section 13263.3.

bb. **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. This WQBEL is applicable to Discharge Point Nos. 001 and 002.

cc. **Salinity.** The discharge contains total dissolved solids (TDS), chloride, sulfate, and electrical conductivity (EC). These are water quality parameters that are indicative of the salinity of the water. Their presence in water can be growth limiting to certain agricultural crops and can affect the taste of water for human consumption. There are no USEPA water quality criteria for the protection of aquatic organisms for these constituents. The Basin Plan contains a chemical constituent objective that incorporates State Maximum Contaminant Levels (MCLs), contains a narrative objective, and contains numeric water quality objectives for EC, TDS, sulfate, and chloride. The numeric water quality objective for the Feather River is the applicable objective because it is more stringent than the other possible objectives.

Table F-8. Salinity Water Quality Criteria/Objectives

Parameter	Basin Plan Objective	Agricultural WQ Goal[1]	Secondary MCL[2]	Effluent	
				Avg	Max
EC (µmhos/cm)	150[3]	Varies[4]	900, 1600, 2200	721	1000
TDS (mg/L)	N/A	Varies	500, 1000, 1500	372	500
Sulfate (mg/L)	N/A	Varies	250, 500, 600	29	140
Chloride (mg/L)	N/A	Varies	250, 500, 600	95	133

1 Agricultural water quality goals based on *Water Quality for Agriculture*, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985)

2 The secondary MCLs are stated as a recommended level, upper level, and a short-term maximum level.

3 Shall not exceed 150 micromhos/cm (90 percentile) in well-mixed waters of the Feather River based on a 10-year rolling average.

4 The EC level in irrigation water that harms crop production depends on the crop type, soil type, irrigation methods, rainfall, and other factors. An EC level of 700 umhos/cm is generally considered to present no risk of salinity impacts to crops. However, many crops are grown successfully with higher salinities.

i. **Chloride**. The secondary MCL for chloride is 250 mg/L, as recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum. The recommended agricultural water quality goal for chloride, that would apply the narrative chemical constituent objective, is 106 mg/L as a long-term average based on Water Quality for Agriculture, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). The 106 mg/L water quality goal is intended to protect against adverse effects on sensitive crops when irrigated via sprinklers.

Chloride concentrations in the effluent ranged from 71.3 mg/L to 133 mg/L, with an average of 95 mg/L, for 119 samples collected by the Discharger from 1 July 2003 through 20 April 2006. Background concentrations in the Feather River ranged from 0.785 mg/L to 2.38 mg/L, with an average of 1.47 mg/L, for 21 samples collected by the Discharger from 24 August 2004 through 19 January 2006. The maximum effluent concentration exceeds the agricultural water quality goal of 106 mg/L.

ii. **Electrical Conductivity (EC)**. The Basin Plan includes a water quality objective that electrical conductivity (at 25°C) "[s]*hall not exceed 150 micromhos/cm (90 percentile) in well-mixed waters of the Feather River*". The Basin Plan objective for EC is applied as a 10-year rolling average. The secondary MCL for EC is 900 µmhos/cm as a recommended level, 1,600 µmhos/cm as an upper level, and 2,200 µmhos/cm as a short-term maximum. The agricultural water quality goal, that would apply the narrative chemical constituents objective, is 700 µmhos/cm as a long-term average based on Water Quality for Agriculture, Food and Agriculture Organization of

the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). The 700 µmhos/cm agricultural water quality goal is intended to prevent reduction in crop yield, i.e. a restriction on use of water, for salt-sensitive crops, such as beans, carrots, turnips, and strawberries. These crops are either currently grown in the area or may be grown in the future. Most other crops can tolerate higher EC concentrations without harm, however, as the salinity of the irrigation water increases, more crops are potentially harmed by the EC, or extra measures must be taken by the farmer to minimize or eliminate any harmful impacts. The numeric water quality objective for the Feather River in the Basin Plan is the applicable objective because it is more stringent than the other possible objectives.

A review of the Discharger's monitoring reports from 2 July 2003 through 30 June 2006 shows an average effluent EC of 721 µmhos/cm, with a range from 520 µmhos/cm to 1,000 µmhos/cm for 805 samples. Based on the SIP approach where the maximum effluent concentration exceeds the applicable water quality objective for EC, these EC levels indicate the potential to cause or contribute to an exceedance of the water quality objective for the Feather River. The background receiving water EC averaged 86 µmhos/cm in 127 sampling events collected by the Discharger from 5 February 2004 through 28 June 2006; the receiving water EC averaged 90 µmhos/cm in 306 sampling events collected by the Discharger from 2 January 1998 through 28 June 2006. These data show that the relatively high effluent concentrations have the potential to cause or contribute to exceedances of the applicable water quality objective for EC. These data also show that some limited assimilative capacity exists in the Feather River for EC.

Order No. R5-2003-0085 required annual water supply monitoring to enable analysis of the source water contribution to the effluent EC. Sufficient monitoring data is not available to determine the expected EC level of the water supply. (Very limited water supply monitoring data was provided by the Discharger during the previous permit term.) This Order requires quarterly monitoring of EC levels in the water supply and Facility influent. This Order contains an average monthly effluent limit for EC of 1000 µmhos/cm. It also includes a receiving water limitation that the discharge can not cause or contribute to the receiving water exceeding the water quality objective for EC in the Feather River.

iii. **Sulfate.** The secondary MCL for sulfate is 250 mg/L as recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum. Sulfate concentrations in the effluent ranged from 17.5 mg/L to 140 mg/L, with an average of 29 mg/L, for 119 samples collected by the Discharger from 1 July 2003 through 20 April 2006. Background concentrations in the Feather River ranged from 2.37 mg/L to 5.07 mg/L, with an average of 3.31 mg/L, for 21 samples collected by the Discharger from 24 August 2004 through 19 January 2006.

iv. **Total Dissolved Solids (TDS).** The secondary MCL for TDS is 500 mg/L as a recommended level, 1,000 mg/L as an upper level, and 1,500 mg/L as a short-term maximum. The recommended agricultural water quality goal for TDS, that would apply the narrative chemical constituent objective, is 450 mg/L as a long-term average based on Water Quality for Agriculture, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). Water Quality for Agriculture evaluates the impacts of salinity levels on crop tolerance and yield reduction, and establishes water quality goals that are protective of the agricultural uses. The 450 mg/L water quality goal is intended to prevent reduction in crop yield, i.e. a restriction on use of water, for salt-sensitive crops. Only the most salt sensitive crops require irrigation water of 450 mg/L or less to prevent loss of yield. Most other crops can tolerate higher TDS concentrations without harm, however, as the salinity of the irrigation water increases, more crops are potentially harmed by the TDS, or extra measures must be taken by the farmer to minimize or eliminate any harmful impacts.

The average TDS effluent concentration was 372 mg/L and ranged from 260 mg/L to 500 mg/L for 31 samples collected by the Discharger from 9 July 2003 through 30 June 2006. These concentrations exceed the applicable water quality objectives. The background receiving water TDS ranged from 20 mg/L to 170 mg/L, with an average of 67 mg/L in 12 sampling events performed by the Discharger from 24 August 2004 through 5 July 2005. These data show that the effluent at times has the potential to contribute to an exceedance of the applicable water quality objectives for TDS.

Order No. R5-2003-0085 required annual water supply monitoring to enable analysis of the source water contribution to the effluent TDS. Based on data provided by the Discharger for December 2003, the water supply TDS concentrations were reported at 119.7 mg/L. It should be noted that water supply monitoring data was not provided by the Discharger for subsequent years during the permit term.

v. **Salinity Effluent Limitations.**

The Antidegradation Policy (Resolution No. 68-16) requires that the Discharger implement best practicable treatment or control (BPTC) of its discharge. For salinity, the Regional Water Board is considering limiting effluent salinity of municipal wastewater treatment plants to an increment of 500 µmhos/cm over the salinity of the municipal water supply as representing BPTC. This Order includes a performance-based average monthly effluent limitation of 1000 µmhos/cm for EC and provides a reopener to adjust the limit based on new information to be provided by the Discharger for the water supply. Revised effluent limitations for salinity based on BPTC may be established subsequent to the collection and analysis by the Discharger of EC in the Discharger's water supply. This Order requires quarterly monitoring of EC and TDS of the Discharger's influent and water supply (see Attachment E,

Sections III.A and IX.B). This Order also includes a receiving water limitation that the discharge cannot cause or contribute to the receiving water exceeding the water quality objective for EC in the Feather River.

This Order also requires the Discharger to implement pollution prevention measures to reduce the salinity in its discharge to the Feather River. Specifically, Special Provision VI.C.3.b. of this Order requires the Discharger to prepare and implement a pollution prevention plan for salinity in accordance with CWC section 13263.3(d)(3), and Special Provision VI.C.3.c requires the Discharger to report on progress in reducing salinity discharges to the Feather River. Implementation measures to reduce salt loading may include source control, mineralization reduction, chemical addition reductions, changing to water supplies with lower salinity, and limiting the salt load from domestic and industrial dischargers. Compliance with these requirements 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.

dd. **Sulfate. (see Subsection for Salinity)**

ee. **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." This Order contains average monthly and average daily effluent limitations for settleable solids.

Because the amount of settleable solids is measured in terms of volume per volume without a mass component, it is impracticable to calculate mass limitations for inclusion in this Order. A daily maximum and average monthly effluent limitation for settleable solids is included in the Order, in lieu of a weekly average, to ensure that the treatment works operate in accordance with design capabilities. These effluent limitations are the same as were required in Order No. R5-2003-0085, and are carried over to this Order.

ff. **2,3,7,8-TCDD and Other Dioxin and Furan Congeners.** The CTR includes a criterion for 2,3,7,8-TCDD of 0.013 pg/L for the protection of human health based on consumption of water and organisms and 0.014 pg/L for ingestion of organisms only. The CTR does not include criteria for other dioxin congeners and there are no formally promulgated numeric water quality criteria for the other dioxin congeners. Therefore, determination of reasonable potential and effluent limitations, when appropriate, would be based on an interpretation of the Basin Plan narrative toxicity standard.

Dioxin congeners appear to be ubiquitous (i.e., ever-present). They exist in the environment worldwide, particularly in the water, soils, and sediment. Dioxins enter the atmosphere through aerial emissions and widely disperse through a number of processes, including erosion, runoff, and volatilization from land or

water. Dioxins occur as a large number of different isomers (congeners). In addition to 2,3,7,8-TCDD, there are many congeners of chlorinated dibenzodioxins (CDDs) and chlorinated dibenzofurans (CDFs) that exhibit toxic effects similar to those of 2,3,7,8-TCDD. Since human exposure to dioxins occurs as a complex mixture of these congeners, a methodology referred to as the Toxic Equivalency Factor (TEF) was developed to assess the health risks posed by mixtures of these compounds. The TEF methodology is a relative potency scheme that ranks the dioxin-like toxicity of a particular congener relative to 2,3,7,8-TCDD, which is the most potent congener. The TEF scheme used for inland surface waters, enclosed bays, and estuaries of California is provided in Section 3 of the SIP.

The SIP is the statewide, adopted Policy that Regional Water Boards must follow for implementing the CTR. In regards to 2,3,7.8-TCDD and its congeners the SIP reads:

> *"Whether or not an effluent limitation is required for 2,3,7,8-TCDD in accordance with Section 1.3 of the Policy, each RWQCB shall require (as described below) major and minor POTW and industrial dischargers in its region to conduct effluent monitoring for the 2,3,7,8-TCDD congeners listed above. The purpose of the monitoring is to assess the presence and amounts of the congeners being discharged to inland surface waters, enclosed bays, and estuaries for the development of a strategy to control these chemicals in a future multi-media approach."*

According to rulemaking documents in development of the SIP, a representative from USEPA noted in a presentation to a public forum that air deposition is a major source of dioxins in soil, and soil erosion is a major source of dioxins in water. To date, the multi-media control strategy referenced in the SIP has not been developed. The introduction to the SIP states, in part, that the Policy establishes monitoring requirements for 2,3,7,8-TCDD equivalents. The SIP does not explicitly direct the Regional Water Boards to establish effluent limits when dioxin congeners are detected in the effluent. Rather it directs the discharger to report the data and in its report to multiply each measured or estimated congener concentration by its respective TEF value (described above) and report the sum of these values to the Regional Water Board. The SIP further states:

> *"Based on the monitoring results, the RWQCB may, at its discretion, increase the monitoring requirement (e.g., increase sampling frequency) to further investigate frequent or significant detections of any congener. At the conclusion of the three-year monitoring period, the SWRCB and RWQCBs will assess the data (a total of six samples each from major POTWs and industrial dischargers, and a total of two samples each from minor POTWs and industrial dischargers), and determine whether further monitoring is necessary."*

2,3,7,8-TCDD was not detected in any of the samples collected in the Facility effluent or in the receiving water. Monitoring of the dioxin and furan congeners in the Facility effluent and receiving water was performed by the Discharger on five occasions between 2 July 2002 and 20 July 2004. In the effluent, three of the congeners (1,2,3,4,6,7,8-HpCDD, OCDD, and OCDF) were reported as detected, however, of the seven detected values, six were estimated values (i.e., j-flagged). In the receiving water, the same three congeners (1,2,3,4,6,7,8-HpCDD, OCDD, and OCDF) were reported as detected, however, all five of the detected values were estimated values (i.e., j-flagged).
The Discharger has not detected 2,3,7,8-TCDD in the effluent. The Discharger has detected non-CTR congeners in its effluent, but at levels which can be only be estimated and not quantified with confidence. There is currently no data indicating that the CTR and non-CTR forms of dioxin in the receiving water are at concentrations that may threaten beneficial uses. Regional Water Board staff believes that there is insufficient data to determine if a water-quality based effluent limitation is appropriate (i.e., feasible). The site specific studies required in the proposed permit are intended to gather additional information to (i) further investigate the frequency or significant detections of any congener, (ii) evaluate the threat to beneficial uses, and (iii) determine the appropriateness of effluent limitations. The proposed permit exceeds the SIP monitoring requirements by requiring quarterly monitoring of all seventeen dioxin congeners for eight consecutive quarters following the effective date of this proposed permit, then annual monitoring thereafter. The proposed permit also requires the Discharger to implement measures to evaluate and reduce detected dioxin congeners. This Order also includes a reopener to allow the Regional Water Board to consider adding effluent limits for dioxin congeners based on results of additional effluent monitoring, if the State Water Board develops the multi-media control strategy discussed in the SIP, or if the State Water Board provides other direction. This Order also requires the Discharger to identify the sources of detected dioxin congeners in its influent and to implement measures to evaluate and reduce those detected dioxin congeners in its discharge to the receiving water. Special Provisions, Section VI.C.3.d. of this Order, requires the Discharger to prepare a 2,3,7,8-TCCD and other dioxin and furan congeners source evaluation and minimization plan. Implementation measures to reduce detectable amounts of congeners may include source control and other effective means. Compliance with these requirements should result in the reduction of detectable amounts of dioxin congeners in the effluent discharged.

gg. **Tetrachloroethylene.** The NTR includes a tetrachloroethylene criterion of 0.8 µg/L for the protection of human health, based on a one-in-a-million cancer risk for waters from which both water and aquatic organisms are consumed. The MEC for tetrachloroethylene was 8 µg/L, based on 28 samples collected between 7 November 2003 and 7 June 2006, while the upstream receiving water tetrachloroethylene concentration was not detected in 10 samples collected between 17 November 2005 and 19 January 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the NTR criterion for tetrachloroethylene.

The upstream receiving water tetrachloroethylene concentration was not detected in 10 samples collected between 17 November 2005 and 19 January 2006. The receiving water concentration has not exceeded the criterion; therefore, there is assimilative capacity for tetrachloroethylene. A dilution credit of up to 221:1 can be granted, based on the available human health dilution.

This Order includes an AMEL and MDEL for tetrachloroethylene of 164 µg/L and 514 µg/L, respectively, based on the NTR criterion for the protection of human health (see Attachment F, Table F-21 for WQBEL calculations). These WQBELs are applicable to Discharge Point Nos. 001 and 002. Based on the sample results in the effluent, it appears the Discharger can meet these new limitations.

hh. **Thallium.** The CTR includes a thallium criterion of 1.7 µg/L for the protection of human health for waters from which both water and aquatic organisms are consumed. The MEC for thallium was 0.31 µg/L, based on seven samples collected between 18 December 2003 and 20 April 2006, while the maximum observed upstream receiving water thallium concentration was 2.2 µg/L, based on 13 samples collected between 30 January 2002 and 14 September 2004. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for thallium.

The receiving water exceeds the CTR criterion for thallium. Therefore, no assimilative capacity is available in the receiving water for thallium and a dilution credit cannot be granted. An AMEL and MDEL for thallium of 1.7 µg/L and 3.4 µg/L, respectively, are included in this Order based on CTR criteria for the protection of human health (see Attachment F, Table F-22 for WQBEL calculations). These WQBELs are applicable to Discharge Point Nos. 001 and 002. Based on the sample results in the effluent, it appears the Discharger can meet these new limitations.

ii. **Total Dissolved Solids. (see Subsection for Salinity)**

jj. **Toxicity.** See Section IV.C.5. of the Fact Sheet regarding whole effluent toxicity.

kk. **Zinc.** The CTR includes hardness-dependent criteria for the protection of freshwater aquatic life for zinc. The criteria for zinc are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for zinc in freshwater are 0.978 for the acute criteria and 0.986 for the chronic criteria. Using the worst-case ambient (lowest upstream receiving water) measured hardness from the effluent and receiving water, (32 mg/L), the applicable chronic criterion (maximum 4-day average concentration) and the applicable acute criterion (maximum 1-hour average concentration) are both 45.63 µg/L, as total recoverable.

The MEC for total zinc was 110 µg/L, based on 30 samples collected between 7 November 2003 and 7 June 2006, while the maximum observed upstream receiving water total zinc concentration was 5.5 µg/L, based on 12 samples

collected between 6 December 2005 and 24 February 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for zinc. An AMEL and MDEL for total zinc of 661 µg/L and 984 µg/L, respectively, are included in this Order based on CTR criteria for the protection of freshwater aquatic life and calculated according to the Discharger's dynamic model (discussed further in Section IV.C.4 below). These WQBELs are applicable to Discharge Point Nos. 001 and 002. Based on the sample results for the effluent, it appears the Discharger can meet these new limitations.

4. WQBEL Calculations

a. As discussed in Section IV.C.3 above, effluent limitations for chlorine residual, persistent chlorinated hydrocarbon pesticides, pathogens, and pH were based on Basin Plan objectives and applied directly as effluent limitations. For diazinon, in accordance with the Basin Plan requirements for the applicable TMDL, waste load allocations were applied directly as WQBELs.

b. As discussed in Section IV.C.3 above, effluent limitations for manganese and molybdenum are based on current treatment plant performance.

c. **Effluent Limitation Based on Dynamic Modeling**. As allowed for under Section 1.4 of the SIP, the Discharger performed dynamic modeling to calculate WQBELs for ammonia, copper, zinc and lead. The Discharger provided, as part of their Report of Waste Discharge, a technical memorandum titled "Dynamic Model for the Derivation of Copper and Ammonia WQBELs for the Yuba City WRP" from Larry Walker Associates to Bill Lewis and Mike Paulucci of the Yuba City WRP, dated 19 June 2006. The Discharger uses a dynamic modeling approach to directly derive appropriate long-term average wasteload allocations (LTAs) and associated AMELs and MDELs for the Facility discharge to the Feather River, using the approach described in USEPA's 1991 *Technical Support Document for Water Quality-based Toxics Control.*

The Regional Water Board performed a technical review of the dynamic modeling approach and submitted specific comments to the Discharger on 19 January 2007. Although, overall the Regional Water Board found the approach to be technically correct, there were two primary issues that were identified that needed to be addressed by the Discharger:

- Too few recursions were run, so that the dynamic model may not have fully converged on a stable solution resulting in a higher error (instability). More recursions are required to so that there is less than a 1 percent difference between model runs.
- The random number generator used is outdated and constraints the robustness of the analysis and increases the uncertainty in the model runs.

The Discharger provided an updated technical memorandum entitled "Interim Updates for the Yuba City Dynamic Model" dated 29 January 2007. A detailed

review was performed by the Regional Water Board of the random number generators. The dynamic model was revised to use a sophisticated double randomization approach that is based on *Numerical Recipes in C the Art of Scientific Computing*, a well-respected technical reference. The model was also rewritten to allow for a significant number recursions to be run (approximately 5,000,000) that stabilized the model results and reduced the error to less than 1 percent. Both of these model revisions addressed the concerns of the Regional Water Board.

Subsequent to the review and concurrence of the updated dynamic model, the Discharger submitted a technical memorandum entitled "Dynamic Model for the Derivation of Select WQBELs for the Yuba City WRP" dated 23 February 2007. This memorandum updated the dynamic model runs for ammonia and copper, and also added new dynamic model runs for zinc. The updates included revision of the effluent data used in the model to be consistent with the 3-year data set agreed upon between the Discharger and the Regional Water Board (see discussion in Section IV.3.c above). Following submittal of the dynamic model runs for ammonia, copper, and zinc the Discharger provided a technical report titled "Submission of Lead Re-Opener Technical Report for Order R5-2007-0134" on 14 August 2008 that included lead dynamic modeling using receiving water data collected after submission of the Report of Waste Discharge. The dynamic model for lead follows the same methodology used to derive the ammonia, copper and zinc effluent limits. The results of the dynamic model are included as part of Section IV.C.4.e of this Fact Sheet.

d. Effluent limitations for aluminum, chlorodibromomethane, cyanide, dichlorobromomethane, diethyl phthalate, iron, methylene blue active substances, nitrite, tetrachloroethylene, and thallium were calculated in accordance with section 1.4 of the SIP and the TSD. The following paragraphs describe the methodology used for calculating effluent limitations.

e. **Effluent Limitation Calculations Based on the SIP.** For each water quality criterion/objective, the effluent concentration allowance (ECA) was calculated using the following steady-state mass balance equation:

$ECA = C + D(C - B)$ *where C>B, and*
$ECA = C$ *where C<=B,*

where:

ECA = effluent concentration allowance
D = dilution credit
C = the priority pollutant criterion/objective
B = the ambient background concentration.

According to the SIP, the ambient background concentration (B) in the equation above shall be the observed maximum with the exception that an ECA calculated from a priority pollutant criterion/objective that is intended to protect human