Table F-6. Copper ECA Evaluation

Lowest Observed Effluent Hardness	56 mg/L (as $CaCO_3$)
Lowest Observed Upstream Receiving Water Hardness	45 mg/L (as $CaCO_3$)
Highest Assumed Upstream Receiving Water Copper Concentration	4.7 µg/L[1]
Copper $ECA_{chronic}$[2]	5.7 µg/L

Effluent Fraction[6]		Fully Mixed Downstream Ambient Concentration			
		Hardness [3] (mg/L)	CTR Criteria [4] (µg/L)	Copper [5] (µg/L)	Complies with CTR Criteria
High Flow	1%	45	4.7	4.7	Yes
	5%	46	4.8	4.8	Yes
	15%	47	4.9	4.9	Yes
	25%	48	5.0	5.0	Yes
	50%	51	5.2	5.2	Yes
Low Flow	75%	53	5.4	5.4	Yes
	100%	56	5.7	5.7	Yes

1 Highest assumed upstream receiving water copper concentration calculated using Equation 1 for chronic criterion at a hardness of 45 mg/L.
2 ECA calculated using Equation 1 for chronic criterion at a hardness of 56 mg/L.
3 Fully mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction using Equation 3.
4 Fully mixed downstream ambient criteria are the chronic criteria calculated using Equation 1 at the mixed hardness.
5 Fully mixed downstream ambient copper concentration is the mixture of the receiving water and effluent copper concentrations at the applicable effluent fraction using Equation 3.
6 The effluent fraction ranges from 1% at the high receiving water flow condition, to 100% at the lowest receiving water flow condition (i.e., effluent dominated).

ECA for Acute Cadmium, Lead, and Acute Silver – For Concave Up Metals (i.e., acute cadmium, lead, and acute silver), the relationship between hardness and the metals criteria is different than for Concave Down Metals. The 2006 Study demonstrates that for Concave Up Metals, the effluent and upstream receiving water can be in compliance with the CTR criteria, but the resulting mixture may contain metals concentrations that exceed the CTR criteria and could cause toxicity. For these metals, the 2006 Study provides a mathematical approach to calculate the ECA that is protective of aquatic life, in all areas of the receiving water affected by the discharge, under all discharge and receiving water flow conditions (see Equation 4, below).

The ECA, as calculated using Equation 4, is based on the reasonable worst-case upstream receiving water hardness, the lowest observed effluent hardness, and assuming no receiving water assimilative capacity for metals (i.e., ambient background metals concentrations are at their respective CTR criterion). Equation 4 is not used in place of the CTR equation (Equation 1). Rather, Equation 4, which is derived using the CTR equation, is used as a direct approach for calculating the

Table F-6 demonstrates that the receiving water is always in compliance with the CTR criteria at the fully-mixed location in the receiving water. It also demonstrates that the receiving water is in compliance with the CTR criteria for all mixtures from the point of discharge to the fully-mixed location. Therefore, a mixing zone is not used for compliance.

ECA. This replaces an iterative approach for calculating the ECA. The CTR equation has been used to evaluate the receiving water downstream of the discharge at all discharge and flow conditions to ensure the ECA is protective (e.g., see Table F-7).

$$ECA \left(\frac{m(H_e - H_{rw})\left(e^{m\{ln(H_{rw})\}+b}\right)}{H_{rw}} \right) + e^{m\{ln(H_{rw})\}+b} \qquad \text{(Equation 4)}$$

Where:

m, b = criterion specific constants (from CTR)
H_e = lowest observed effluent hardness
H_{rw} = reasonable worst-case upstream receiving water hardness

An example similar to the Concave Down Metals is shown for lead, a Concave Up Metal, in Table F-7, below. As previously mentioned, the lowest effluent hardness is 56 mg/L, while the upstream receiving water hardness ranged from 45 mg/L to 114 mg/L. In this case, the reasonable maximum upstream receiving water hardness to use in Equation 4 to calculate the ECA is 114 mg/L.

Using the procedures discussed above to calculate the ECA for all Concave Up Metals will result in WQBELs that are protective under all potential effluent/receiving water flow conditions (high flow to low flow) and under all known hardness conditions, as demonstrated in Table F-7, for lead.

Table F-7. Lead ECA Evaluation

Lowest Observed Effluent Hardness	56 mg/L
Reasonable Maximum Upstream Receiving Water Hardness	114 mg/L
Reasonable Worst-case Upstream Receiving Water Lead Concentration	3.8 µg/L[1]
Lead $ECA_{chronic}$[2]	1.3 µg/L

Effluent Fraction[6]		Fully Mixed Downstream Ambient Concentration			
		Hardness [3] (mg/L) (as $CaCO_3$)	CTR Criteria [4] (µg/L)	Lead [5] (µg/L)	Complies with CTR Criteria
High Flow	1%	113	3.7	3.7	Yes
	5%	111	3.6	3.6	Yes
	15%	105	3.4	3.4	Yes
	25%	100	3.2	3.2	Yes
	50%	85	2.6	2.5	Yes
Low Flow	75%	71	2.0	1.9	Yes
	100%	56	1.5	1.3	Yes

1 Reasonable worst-case upstream receiving water lead concentration calculated using Equation 1 for chronic criterion at a hardness of 114 mg/L.
2 ECA calculated using Equation 4 for chronic criteria.
3 Fully mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.
4 Fully mixed downstream ambient criteria are the chronic criteria calculated using Equation 1 at the mixed hardness.
5 Fully mixed downstream ambient lead concentration is the mixture of the receiving water and effluent lead concentrations at the applicable effluent fraction.
6 The effluent fraction ranges from 1% at the high receiving water flow condition, to 100% at the lowest receiving water flow condition (i.e., effluent dominated).

Based on the procedures discussed above, Table F-8 lists all the CTR hardness-dependent metals and the associated ECA used in this Order.

Table F-8. Summary of ECA Evaluations for CTR Hardness-dependent Metals

CTR Metals	ECA (µg/L, total recoverable)	
	acute	chronic
Copper	8.1	5.7
Chromium III	1,080	129
Cadmium	2.2	1.6
Lead	34	1.3
Nickel	287	32
Silver	0.64	--
Zinc	73	73

5. Determining the Need for WQBELs

a. **Constituents with Total Maximum Daily Load (TMDL).** The Central Valley Water Board developed WQBELs for chlorpyrifos and diazinon that have available wasteload allocations under a TMDL, which was approved on 11 August 2008. The effluent limitations for these pollutants were established regardless of whether or not there is reasonable potential for the pollutants to be present in the discharge at levels that would cause or contribute to a violation of water quality standards. The Central Valley Water Board developed WQBELs for these pollutants pursuant to 40 CFR section

122.44(d)(1)(vii), which does not require or contemplate an RPA. Similarly, the SIP at Section 1.3 recognizes that an RPA is not appropriate if a TMDL has been developed.

This Order contains a WQBEL for diazinon and chlorpyrifos. The diazinon and chlorpyrifos limitation was established based on a calculated wasteload allocation, which accounts for synergistic effects of diazinon and chlorpyrifos for the Facility contained in the Sacramento and Feather River Diazinon and Chlorpyrifos TMDL. As required by 40 CFR section 122.44(d)(1)(vii), the Central Valley Water Board shall ensure there is a WQBEL for diazinon and chlorpyrifos in the WDR's that is consistent with the assumptions and requirements of the available wasteload allocation. Based on the water quality monitoring done at the time of the TMDL adoption, which set the wasteload allocation at the level necessary to attain water quality standards, the Central Valley Water Board has determined that the WQBEL is consistent with the assumptions of the TMDL. Similarly, compliance with the effluent limitation will satisfy the requirements of the TMDL.

b. **Constituents with No Reasonable Potential.** WQBELs are not included in this Order for constituents that do not demonstrate reasonable potential (i.e., constituents were not detected in the effluent or receiving water at concentrations exceeding applicable water quality criteria); however, monitoring for those pollutants is established in this Order as required by the SIP. If the results of effluent monitoring demonstrate reasonable potential, this Order may be reopened and modified by adding an appropriate effluent limitation.

Most constituents with no reasonable potential are not discussed in this Order. However, the following constituents were found to have no reasonable potential after assessment of the data:

i. **Alpha-BHC**

(a) **WQO.** The Basin Plan requires that no individual pesticides 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 Basin Plan pesticide non-detect objective has been interpreted to be equal to the lowest minimum level value for alpha-BHC contained in Appendix 4 of the SIP (i.e., 0.01 µg/L) for purposes of determination of reasonable potential. In addition, the CTR contains numeric criteria for alpha-BHC of 0.0039 µg/L for freshwaters from which both water and organisms are consumed.

(b) **RPA Results.** Alpha-BHC was detected in the effluent once out of five monitoring events between March 2008 through February 2013 at Monitoring Location EFF-001 (minimum MDL 0.005 µg/L, minimum RL 0.01 µg/L). Alpha-BHC was not detected at Monitoring Location EFF-002 based on four samples collected between March 2008 and February 2013 (minimum MDL 0.005 µg/L, minimum RL 0.01 µg/L). Alpha-BHC was not detected in the upstream receiving

water in five samples collected from March 2008 through February 2013 (minimum MDL 0.005 µg/L, minimum RL 0.01 µg/L). The laboratory-detected effluent value at Monitoring Location EFF-001 was estimated to be 0.006 µg/L; however, the result was not quantifiable (i.e., "DNQ"). The date of sample collection was 13 March 2008. The laboratory reporting level was 0.01 µg/L and met the minimum reporting level for alpha-BHC provided in Appendix 4 of the SIP, which is also 0.01 µg/L. The MEC of 0.006 µg/L DNQ does not exceed the Basin Plan objective of non-detect interpreted as the SIP ML of 0.01 µg/L.

Data reported below the laboratory reporting level indicates the data may not be valid due to possible matrix interferences during the analytical procedure. Therefore, data reported below the laboratory reporting level is not considered valid data for use in determining reasonable potential. Section 1.2 of the SIP states that the Regional Water Board has discretion to consider if any data are inappropriate or insufficient for use in the RPA. Due to one sample having a detectable value and the detected value being "not quantifiable" by the laboratory performing the analysis, the Central Valley Water Board finds that alpha-BHC in the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion.

ii. Chlorodibromomethane

(a) WQO. The CTR includes a criterion of 0.41 µg/L for chlorodibromomethane for the protection of human health for waters from which both water and organisms are consumed. Order R5-2008-0037 included effluent limitations for chlorodibromomethane based on the CTR criterion.

(b) RPA Results. The MEC for chlorodibromomethane was 0.4 µg/L based on 26 samples collected between March 2008 and February 2013 at Monitoring Location EFF-001 (minimum MDL 0.06 µg/L, minimum RL 0.5 µg/L). Chlorodibromomethane was not detected in the effluent based on 19 samples collected between March 2008 and February 2013 at Monitoring Location EFF-002 (minimum MDL 0.06 µg/L, minimum RL 0.5 µg/L). Chlorodibromomethane was not detected in the upstream receiving water based on 18 samples collected between March 2008 and February 2013 (minimum MDL 0.06 µg/L, minimum RL 0.5 µg/L). The applicable ML contained in Appendix 4 of the SIP for chlorodibromomethane is 0.5 µg/L. Therefore, chlorodibromomethane in the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion of 0.41 µg/L, and the effluent limitations for chlorodibromomethane have not been retained in this Order. Removal of these effluent limitations is in accordance with federal anti-backsliding regulations (see section IV.D.3 of the Fact Sheet).

iii. Heptachlor Epoxide

(a) WQO. The Basin Plan requires that no individual pesticides 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 Basin Plan pesticide non-detect objective has been interpreted to be equal to the lowest minimum level value for heptachlor epoxide contained in Appendix 4 of the SIP (i.e., 0.01 µg/L) for purposes of determination of reasonable potential. In addition, the CTR contains numeric criteria for heptachlor epoxide of 0.00010 µg/L for freshwaters from which both water and organisms are consumed. Order R5-2008-0037 included an effluent limitation for heptachlor epoxide based on the Basin Plan objective.

(b) **RPA Results.** Heptachlor epoxide was detected in the effluent once out of 26 monitoring events between March 2008 through February 2013 at Monitoring Location EFF-001 (minimum MDL 0.002 µg/L, minimum RL 0.01 µg/L). The laboratory-detected effluent value at Monitoring Location EFF-001 was estimated to be 0.005 µg/L; however, the result was not quantifiable (i.e., "DNQ"). The date of sample collection was 2 April 2008. The laboratory reporting level was 0.01 µg/L and met the minimum reporting level for heptachlor epoxide provided in Appendix 4 of the SIP, which is also 0.01 µg/L. The laboratory detected, but not quantified value does not exceed the Basin Plan objective of non-detect interpreted as the SIP ML of 0.01 µg/L. Heptachlor epoxide was not detected at Monitoring Location EFF-002 based on 17 samples collected between March 2008 and February 2013 (minimum MDL 0.002 µg/L, minimum RL 0.01 µg/L). Heptachlor epoxide was not detected in the upstream receiving water based on 17 samples collected from March 2008 through February 2013 (minimum MDL 0.002 µg/L, minimum RL 0.01 µg/L).

Data reported below the laboratory reporting level indicates the data may not be valid due to possible matrix interferences during the analytical procedure. Therefore, data reported below the laboratory reporting level is not considered valid data for use in determining reasonable potential. Section 1.2 of the SIP states that the Regional Water Board has discretion to consider if any data are inappropriate or insufficient for use in the RPA. Due to one sample having a detectable value and the detected value being "not quantifiable" by the laboratory performing the analysis, the Central Valley Water Board finds that heptachlor epoxide in the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion. The effluent limitation for heptachlor epoxide has not been retained in this Order. Removal of this effluent limitation is in accordance with federal anti-backsliding regulations (see section IV.D.3 of the Fact Sheet).

iv. Lead, Total Recoverable

(a) **WQO.** The CTR includes hardness-dependent criteria for the protection of freshwater aquatic life for lead. These criteria for lead are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. Default USEPA translators were used in

this Order. Order R5-2008-0037 included effluent limitations for lead based on the CTR criterion.

(b) RPA Results. Section IV.C.2.e includes procedures for conducting the RPA for lead. The maximum observed upstream receiving water lead concentration was 4.0 µg/L (as total recoverable), based on 18 samples collected between March 2008 and February 2013 (minimum MDL 0.1 µg/L, minimum RL 0.5 µg/L). Based on the lowest observed upstream receiving water hardness of 45 mg/L (as $CaCO_3$) the applicable total recoverable criteria for evaluating the ambient background concentration are 1.2 µg/L and 30 µg/L, for the chronic and acute criteria respectively. Based on this data, the maximum ambient lead concentration exceeds the applicable CTR criteria.

As discussed in Section IV.C.2.e for comparing the MEC to the criteria, the reasonable worst-case downstream ambient hardness should be used. Based on the reasonable worst-case downstream hardness, the applicable total recoverable criteria are 1.3 µg/L and 34 µg/L for the chronic and acute criteria, respectively. The MEC for lead at Monitoring Location EFF-001 was 0.3 µg/L based on 26 samples collected between March 2008 and February 2013 (minimum MDL 0.1 µg/L, minimum RL 0.2 µg/L); however the MEC result was not quantifiable (i.e., "DNQ"). The MEC for lead at Monitoring Location EFF-002 was 0.2 µg/L based on 17 samples collected between March 2008 and February 2013 (minimum MDL 0.1 µg/L, minimum RL 0.5 µg/L); however the MEC result was not quantifiable (i.e., "DNQ"). The MEC of 0.3 µg/L from Monitoring Location EFF-001 occurred on 3 November 2009 and 4 December 2009. The laboratory reporting level was 0.6 µg/L on 3 November 2009 and 0.5 µg/L on 4 December 2009. The 4 December 2009 result met the minimum reporting level for lead provided in Appendix 4 of the SIP, which is also 0.5 µg/L. The 3 November 2009 result is slightly greater than the minimum reporting level for lead (0.6 µg/L versus 0.5 µg/L) as established in the SIP, however still indicates a non-quantifiable result less than the minimum reporting level.

Date reported below the laboratory reporting level indicates the data may not be valid due to possible matrix interferences during the analytical procedure. Therefore, data reported below the laboratory reporting level is not considered valid data for use in determining reasonable potential. Section 1.2 of the SIP states that the Regional Water Board has discretion to consider if any data are inappropriate or insufficient for use in the reasonable potential analysis. Due to the relatively large data set of 33 samples, with no detectable values above the minimum reporting level of 0.5 µg/L by the laboratory performing the analysis, the Central Valley Water Board finds that lead in the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion, and the effluent limitations for lead have not been retained in this Order. Removal of these effluent limitations is in accordance with federal anti-backsliding regulations (see section IV.D.3 of the Fact Sheet).

v. Salinity

(a) WQO. The Basin Plan contains a chemical constituent objective that incorporates state MCLs, contains a narrative objective, and contains numeric water quality objectives for certain specified water bodies for electrical conductivity, total dissolved solids, sulfate, and chloride. The USEPA Ambient Water Quality Criteria for Chloride recommends acute and chronic criteria for the protection of aquatic life. There are no USEPA water quality criteria for the protection of aquatic life for electrical conductivity, total dissolved solids, and sulfate. Additionally, there are no USEPA numeric water quality criteria for the protection of agricultural, live stock, and industrial uses. Numeric values for the protection of these uses are typically based on site specific conditions and evaluations to determine the appropriate constituent threshold necessary to interpret the narrative chemical constituent Basin Plan objective. The Central Valley Water Board must determine the applicable numeric limit to implement the narrative objective for the protection of agricultural supply. The Central Valley Water Board is currently implementing the CV-SALTS initiative to develop a Basin Plan Amendment that will establish a salt and nitrate Management Plan for the Central Valley. Through this effort the Basin Plan will be amended to define how the narrative water quality objective is to be interpreted for the protection of agricultural use. All studies conducted through this Order to establish an agricultural limit to implement the narrative objective will be reviewed by and consistent with the efforts currently underway by CV-SALTS.

Table F-9. Salinity Water Quality Criteria/Objectives

Parameter	Agricultural WQ Objective[1]	Secondary MCL[3]	USEPA NAWQC	Discharge Point 001		Discharge Point 002	
				Average	Maximum	Average	Maximum
EC (µmhos/cm)	Varies[2]	900, 1600, 2200	N/A	374	471	361	478
TDS (mg/L)	Varies	500, 1000, 1500	N/A	247	305	215	290
Sulfate (mg/L)	Varies	250, 500, 600	N/A	26	32	18	23
Chloride (mg/L)	Varies	250, 500, 600	860 1-hr 230 4-day	40	62	54	82

1 Narrative chemical constituent objective of the Basin Plan. Procedures for establishing the applicable numeric limitation to implement the narrative objective can be found in the Policy for Application of Water Quality, Chapter IV, Section 8 of the Basin Plan. However, the Basin Plan does not require improvement over naturally occurring background concentrations. In cases where the natural background concentration of a particular constituent exceeds an applicable water quality objective, the natural background concentration will be considered to comply with the objective.

2 Maximum calendar annual average.

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

(1) Chloride. The Secondary MCL for chloride is 250 mg/L, as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum.

(2) **Electrical Conductivity.** The Secondary MCL for EC is 900 µmhos/cm as a recommended level, 1600 µmhos/cm as an upper level, and 2200 µmhos/cm as a short-term maximum.

(3) **Sulfate.** The Secondary MCL for sulfate is 250 mg/L as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum.

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

(b) RPA Results

(1) **Chloride.** Chloride concentrations in the effluent at Monitoring Location EFF-001 ranged from 28.2 mg/L to 62.2 mg/L, with an average of 40 mg/L. Chloride concentrations in the effluent at Monitoring Location 002 ranged from 24.5 mg/L to 82.3 mg/L, with an average of 54 mg/L. These levels do not exceed the Secondary MCL. Background concentrations in Churn Creek were not available.

(2) **Electrical Conductivity.** A review of the Discharger's monitoring reports shows an average effluent EC of 374 µmhos/cm at Monitoring Location EFF-001, with a range from 261 µmhos/cm to 471 µmhos/cm. The average effluent EC at Monitoring Location EFF-002 was 361 µmhos/cm, with a range from 220 µmhos/cm to 478 µmhos/cm. These levels do not exceed the Secondary MCL. The background receiving water EC averaged 183 µmhos/cm.

(3) **Sulfate.** Sulfate concentrations in the effluent from Monitoring Location EFF-001 ranged from 22.4 mg/L to 31.6 mg/L, with an average of 26 mg/L. Sulfate concentrations in the effluent from Monitoring Location EFF-002 ranged from 14.1 mg/L to 23 mg/L, with an average of 18 mg/L. These levels do not exceed the Secondary MCL. Background concentrations in Churn Creek were not available.

(4) **Total Dissolved Solids.** The average TDS effluent concentration at Monitoring Location EFF-001 was 247 mg/L with concentrations ranging from 159 mg/L to 305 mg/L. The average TDS effluent concentration at Monitoring Location EFF-002 was 215 mg/L with concentrations ranging from 119 mg/L to 290 mg/L. These levels do not exceed the Secondary MCL. Background concentrations in Churn Creek were not available.

Based on the relatively low reported salinity, the discharge does not have reasonable potential to cause or contribute to an in-stream excursion of water quality objectives for salinity. However, since the Discharger discharges to Churn Creek, a tributary of the Sacramento River and eventually the Sacramento-San Joaquin Delta, of additional concern is the salt contribution to Delta waters. Allowing the Discharger to increase its current salt loading may be

contrary to the Region-wide effort to address salinity in the Central Valley. Therefore, in order to ensure that the Discharger will continue to control the discharge of salinity, this Order includes a requirement to develop and implement a salinity evaluation and minimization plan. Also water supply monitoring is required to evaluate the relative contribution of salinity from the source water to the effluent.

c. **Constituents with No Data or Insufficient Data.** Reasonable potential cannot be determined for the following constituents because effluent data are limited or ambient background concentrations are not available. The Discharger is required to continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available, further analysis will be conducted to determine whether to add numeric effluent limitations or to continue monitoring.

i. **Bis (2-Ethylhexyl) Phthalate**

(a) **WQO.** The CTR includes a criterion of 1.8 µg/L for bis (2-ethylhexyl) phthalate for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** Bis (2-ethylhexyl) phthalate is a common contaminant of sample containers, sampling apparatus, and analytical equipment, and sources of detected bis (2-ethylhexyl) phthalate may be from plastics used for sampling or analytical equipment. "Clean techniques" are used to ensure that sample containers, sampling apparatus, and analytical equipment are not sources of the detections for monitoring bis (2-ethylhexyl) phthalate.

Bis (2-ethylhexyl) phthalate was detected in the effluent in one out of five samples at Monitoring Location EFF-001 collected between March 2008 and January 2012 (minimum MDL 0.2 µg/L, minimum RL 0.9 µg/L). The effluent value was estimated to be 2.0 µg/L on 27 January 2011; however, the result was not quantifiable (i.e., "DNQ"). The laboratory reporting level for this sample met the minimum reporting level for bis (2-ethylhexyl) phthalate provided in Appendix 4 of the SIP, which is 5 µg/L. Data reported below the laboratory reporting level indicates the data may not be valid due to possible matrix interferences during the analytical procedure. Therefore, data reported below the laboratory reporting level is not considered valid data for use in determining reasonable potential. Section 1.2 of the SIP states that the Regional Water Board has discretion to consider if any data are inappropriate or insufficient for use in the RPA. Due to one sample having a detectable value and the detected value being "not quantifiable" by the laboratory performing the analysis, the Central Valley Water Board finds that bis (2-ethylhexyl) phthalate in the discharge at Discharge Point 001 does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion.

Bis (2-ethylhexyl) phthalate was detected in the effluent in two out of four samples at Monitoring Location EFF-002 collected between March 2008 and

February 2013 with an MEC of 7.0 µg/L (minimum MDL 0.2 µg/L, minimum RL 0.9 µg/L). The laboratory-detected MEC result was 7.0 µg/L on 27 January 2011. The laboratory reporting level for this sample met the minimum reporting level for bis (2-ethylhexyl) phthalate provided in Appendix 4 of the SIP, which is 5 µg/L.

In addition, bis (2-ethylhexyl) phthalate was detected but not quantified once out of five samples in the upstream receiving water at an estimated concentration of 1.0 µg/L (minimum MDL 0.2 µg/L, minimum RL 0.9 µg/L).

According to the Discharger, "clean techniques" were not utilized during the term of Order R5-2008-0037 at any of the monitoring locations. Because clean techniques were not required or utilized during the monitoring events, and due to the high potential for sample contamination for bis (2-ethylhexyl) phthalate when clean techniques are not used, the data may not be representative of actual effluent and receiving water quality for bis (2-ethylhexyl) phthalate. Therefore, potentially contaminated data is not considered valid data for use in determining reasonable potential. Section 1.3, Step 8 of the SIP allows the Central Valley Water Board to require additional monitoring for a pollutant in place of an effluent limitation if data are unavailable or insufficient. The Central Valley Water Board is not establishing effluent limitations for bis (2-ethylhexyl) phthalate at this time. Instead of limitations, additional monitoring using "clean techniques" has been established for bis (2-ethylhexyl) phthalate. Should monitoring results 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 limitations.

ii. Carbon Tetrachloride

(a) WQO. The CTR includes a criterion of 0.25 µg/L for carbon tetrachloride for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. Carbon tetrachloride was detected, but not quantified by the laboratory, in the effluent once out of five monitoring events at Monitoring Location EFF-001 collected between March 2008 and February 2013 (minimum MDL 0.1 µg/L, minimum RL 1 µg/L). The laboratory-detected effluent value at Monitoring Location EFF-001 was estimated to be 0.3 µg/L; however, the result was not quantifiable (i.e., "DNQ"). The date of sample collection was 8 February 2011. The laboratory reporting level was 1.0 µg/L and did not meet the minimum reporting level for carbon tetrachloride provided in Appendix 4 of the SIP, which is 0.5 µg/L. Carbon tetrachloride was not detected at Monitoring Location EFF-002 based on four samples collected between March 2008 and February 2013 (minimum MDL 0.1 µg/L, minimum RL 1 µg/L). Carbon tetrachloride was not detected in the upstream receiving water in five samples collected between March 2008 and February 2013 (minimum MDL 0.1 µg/L, minimum RL 1 µg/L).

The Discharger has identified that in the production of chlorine gas the carbon tetrachloride byproduct has been found to be present in the bottling process [the Discharger uses chlorine gas for disinfection]. The Discharger is in the process to evaluating alternatives to limit the introduction of the pollutant. Section 1.3, Step 8 of the SIP allows the Central Valley Water Board to require additional monitoring for a pollutant in place of an effluent limitation if data are unavailable or insufficient. Therefore, the Central Valley Water Board is not establishing effluent limitations for carbon tetrachloride at this time. Instead of limitations, additional monitoring has been established for carbon tetrachloride.

iii. Iron

(a) **WQO.** The Secondary MCL – Consumer Acceptance Limit for iron is 300 µg/L, which is used to implement the Basin Plan's chemical constituent objective for the protection of municipal and domestic supply.

(b) **RPA Results.** For priority pollutants, the SIP dictates the procedures for conducting the RPA. Iron is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used its judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent. The most stringent objective is the Secondary MCL, which is derived from human welfare considerations (e.g., taste, odor, laundry staining), not for toxicity. Secondary MCLs are drinking water standards contained in Title 22 of the California Code of Regulations. Title 22 requires compliance with these standards on an annual average basis, when sampling at least quarterly. To be consistent with how compliance with the standards is determined, the RPA was conducted based on the calendar annual average iron concentrations.

Iron in the effluent did not exhibit reasonable potential to exceed the Secondary MCL at Monitoring Location EFF-001 based on four samples collected between March 2008 and February 2013. However, as shown in the following table, the discharge exceeded the Secondary MCL for iron at Monitoring Location EFF-002 in one sample.

Table F-10. Effluent Monitoring Data for Iron

Parameter	Date	Effluent Concentration (µg/L)	
		Discharge Point 001	Discharge Point 002
Iron, Total Recoverable	16 January 2009	42	177
	5 March 2010	26	--
	9 March 2010	--	164
	3 January 2011	23	537
	23 January 2012	38	275

Effluent is stored in a reclaimed water reservoir prior to being discharged from Discharge Point 002. Given the low concentrations in the treated effluent at

Discharge Point 001, the source of iron observed in the effluent at Discharge Point 002 is uncertain and does not appear to originate in the treated effluent. Further, effluent data is limited to a single sampling event during each year, taken in January or March, which is insufficient for evaluation against the Secondary MCL on an annual average basis. Therefore, the Central Valley Water Board is not establishing effluent limitations for iron at this time. Instead of limitations, additional monitoring has been established for iron. Should monitoring results 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.

iv. Manganese

(a) WQO. The Secondary MCL – Consumer Acceptance Limit for manganese is 50 µg/L, which is used to implement the Basin Plan's chemical constituent objective for the protection of municipal and domestic supply.

(b) RPA Results. For priority pollutants, the SIP dictates the procedures for conducting the RPA. Manganese is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used its judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent. The most stringent objective is the Secondary MCL, which is derived from human welfare considerations (e.g., taste, odor, laundry staining), not for toxicity. Secondary MCLs are drinking water standards contained in Title 22 of the California Code of Regulations. Title 22 requires compliance with these standards on an annual average basis, when sampling at least quarterly. To be consistent with how compliance with the standards is determined, the RPA was conducted based on the calendar annual average manganese concentrations.

Manganese in the effluent did not exhibit reasonable potential to exceed the Secondary MCL at Monitoring Location EFF-001 based on four samples collected between March 2008 and February 2013. However, as shown in the following table, the discharge exceeded the Secondary MCL for manganese at Monitoring Location EFF-002.

Table F-11. Effluent Monitoring Data for Manganese

Parameter	Date	Effluent Concentration (µg/L)	
		Discharge Point 001	Discharge Point 002
Manganese, Total Recoverable	16 January 2009	ND	ND
	26 January 2010	9.6	199
	5 March 2010	2	--
	9 March 2010	--	59.3
	3 January 2011	9.5	62.9
	23 January 2012	12.9	57.5

Effluent is stored in a reclaimed water reservoir prior to being discharged from Discharge Point 002. Given the low concentrations in the treated effluent at Discharge Point 001, the source of manganese observed in the effluent at Discharge Point 002 is uncertain and does not appear to originate from the treated effluent. Further, effluent data is limited to a single sampling event during each year, taken in January or March, which is insufficient for evaluation against the Secondary MCL on an annual average basis. Therefore, the Central Valley Water Board is not establishing effluent limitations for manganese at this time. Instead of limitations, additional monitoring has been established for manganese. Should monitoring results 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.

d. **Constituents with Reasonable Potential.** The Central Valley 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 ammonia~~, chlorine residual~~, copper, diazinon and chlorpyrifos, dichlorobromomethane, nitrate plus nitrite, pathogens, pH, and zinc. WQBELs for these constituents are included in this Order. A summary of the RPA is provided in Attachment G, and a detailed discussion of the RPA for each constituent is provided below.

i. **Ammonia**

(a) **WQO.** The NAWQC 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 (e.g., freshwater unionid mussels) and young fish experienced increasing chronic toxicity effects with increasing temperature.

Review of the *Sensitive Freshwater Mussel Surveys in the Pacific Southwest Region: Assessment of Conservation Status* published August 2010 by The Nature Conservancy, did not contain any survey information for Churn Creek. However, the Sacramento River, at approximately 1 mile upstream of Churn Creek's confluence with the Sacramento River, was surveyed and no mussels were found to be present. The Report did not provide any additional surveys for mussels within 100 river miles downstream of the discharge, in the Sacramento River. At this time there is limited information on whether mussels are present in Churn Creek, however, since mussels were not found at the Sacramento River survey station above the confluence of the receiving water with the Sacramento River, the presence of mussels at the discharge location were not assumed for purposes of calculating the ammonia criteria. Churn Creek and its tributaries

have a beneficial use of cold freshwater habitat and the presence of salmonids and early fish life stages in Churn Creek and its tributaries is well-documented, therefore the recommended ammonia criteria for waters where salmonids and early life stages are present were used.

The Central Valley Water Board may require additional information from the Discharger in the future to evaluate whether more restrictive ammonia criteria for other species (i.e., unionid mussels) is applicable for Churn Creek. However, at this time, ammonia criteria have been calculated with the assumption that mussels are not present.

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.

Receiving water monitoring for pH and temperature was conducted once per week, resulting in 86 sets of paired pH and temperature data. In accordance with USEPA's 2013 Aquatic Life Ambient Water Quality Criteria For Ammonia – Freshwater, the 30-day CCC was determined by calculating the CCC for each paired pH and temperature set and taking the 95th percentile CCC (with criteria ranked from less stringent to more stringent). The resulting 30-day CCC is 5.22 mg/L. 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 5.22 mg/L (as N), the 4-day average concentration that should not be exceeded is 13.05 mg/L.

(b) RPA Results. The effluent at Monitoring Location EFF-001 was sampled for ammonia 97 times from March 2008 through February 2013 with a maximum effluent ammonia concentration of 5.72 mg/L. The effluent at Monitoring Location EFF-002 was sampled for ammonia 43 times from March 2008 through February 2013 with a maximum effluent ammonia concentration of 5.91 mg/L. The effluent exceeds the acute criteria and the 30-day CCC. Therefore, ammonia in the discharge has reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's narrative toxicity objective.

(c) WQBELs. The Central Valley 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 CCC. 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 CCC was calculated assuming a 30-day averaging period. The lowest LTA representing the acute, 4-day CCC, and 30-day CCC is then selected for deriving the average monthly effluent limitation (AMEL) and the maximum daily effluent limitation (MDEL). The remainder of the WQBEL calculation for ammonia was

performed according to the SIP procedures. This Order contains a final AMEL and MDEL for ammonia of 0.74 mg/L and 2.1 mg/L, respectively, based on the acute criterion.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 5.91 µg/L is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. 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. Therefore, a compliance time schedule for compliance with the ammonia effluent limitations is established in Time Schedule Order (TSO) No. R5-2014-0053 in accordance with Water Code section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with Water Code section 13263.3.

ii. Biochemical Oxygen Demand/Total Suspended Solids

(a) **WQO.** 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. Tertiary treatment is necessary to protect the beneficial uses of the receiving stream. The principal design parameter for wastewater treatment plants is the daily BOD_5 and TSS loading rate and the corresponding removal rate of the system. The application of tertiary treatment processes results in the ability to achieve lower levels for BOD_5 and TSS than the secondary standards currently prescribed in 40 CFR Part 133; the minimum 30-day average, weekly average, and maximum daily level of effluent quality attainable by a tertiary system are 10 mg/L, 15 mg/L, and 30 mg/L, respectively.

(b) **RPA Results.** BOD_5 is a measure of the amount of oxygen used in the biochemical oxidation of organic matter. The Discharger is a POTW that treats domestic wastewater through a tertiary-level treatment system. The principal design parameter for wastewater treatment plants is the daily BOD_5 and TSS loading rate and the corresponding removal rate of the system. The application of tertiary treatment processes results in the ability to achieve lower levels for BOD_5 and TSS than the secondary standards currently prescribed. BOD_5 and TSS are oxygen depleting substances that can lower dissolved oxygen levels in the receiving water causing toxicity to fish if not controlled; such discharges would violate the Basin Plan narrative toxicity objective. BOD_5 and TSS are inherent in the wastestream of a POTW. Levels of BOD_5 and TSS discharged without adequate treatment are toxic and must be controlled. Standard secondary wastewater treatment does not adequately remove BOD_5 and TSS to levels that are protective of fish and other aquatic life. Therefore it is appropriate to control BOD_5 and TSS for the protection of aquatic life by protecting water quality. Therefore, this Order contains effluent limitations for BOD_5 and TSS that are technically based on the capability of a tertiary system. In addition to the average weekly and average monthly effluent limitations, a daily maximum effluent limitation 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.

(c) WQBELs. This Order contains AMELs and AWELs for BOD_5 and TSS of 10 mg/L and 15 mg/L respectively, which is technically based on the capability of a tertiary system. In addition, a daily maximum effluent limitation for BOD_5 and TSS at 30 mg/L is included in this Order to ensure that the treatment works are not organically overloaded and operate in accordance with design capabilities.

(d) Plant Attainability. Analysis of the effluent data shows that the Facility can meet these WQBELs.

~~iii. Chlorine Residual~~

~~(a) **WQO.** USEPA developed NAWQC for protection of freshwater aquatic life for chlorine residual. The recommended 4-day average (chronic) and 1-hour average (acute) criteria for chlorine residual are 0.011 mg/L and 0.019 mg/L, respectively. These criteria are protective of the Basin Plan's narrative toxicity objective.~~

~~(b) **RPA Results.** The concentrations of chlorine used to disinfect wastewater are high enough to harm aquatic life and violate the Basin Plan narrative toxicity objective if discharged to the receiving water. Reasonable potential therefore does exist and effluent limits are required.~~

~~Federal regulations at 40 CFR 122.44(d)(1)(i) require that, "*Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*" For priority pollutants, the SIP dictates the procedures for conducting the RPA. Chlorine is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used its judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent.~~

~~USEPA's September 2010 NPDES Permit Writer's Manual, page 6-30, states, "*State implementation procedures might allow, or even require, a permit writer to determine reasonable potential through a qualitative assessment process without using available facility-specific effluent monitoring data or when such data are not available. ...A permitting authority might also determine that WQBELs are required for specific pollutants for all facilities that exhibit certain operational or discharge characteristics (e.g., WQBELs for pathogens in all permits for POTWs discharging to contact recreational waters).*" USEPA's TSD also recommends that factors other than effluent data should be considered in the RPA, "*When determining whether or not a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality*~~

~~*criterion for individual toxicants or for toxicity, the regulatory authority can use a variety of factors and information where facility-specific effluent monitoring data are unavailable. These factors also should be considered with available effluent monitoring data."* With regard to POTWs, USEPA recommends that, *"POTWs should also be characterized for the possibility of chlorine and ammonia problems."* (TSD, p. 50)~~

~~The Discharger uses chlorine for disinfection, which is extremely toxic to aquatic organisms. Although the Discharger uses a sulfur dioxide process to dechlorinate the effluent prior to discharge to Churn Creek, the existing chlorine use and the potential for chlorine to be discharged provides the basis for the discharge to have a reasonable potential to cause or contribute to an in-stream excursion above the NAWQC.~~

~~(c) **WQBELs.** 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. This Order contains a 4-day average effluent limitation and 1-hour average effluent limitation for chlorine residual of 0.011 mg/L and 0.019 mg/L, respectively, based on USEPA's NAWQC, which implements the Basin Plan's narrative toxicity objective for protection of aquatic life.~~

~~(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that total residual chorine was not detected in the effluent. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.~~

~~iv.~~iii. Copper, Total Recoverable

(a) **WQO.** The Basin Plan and CTR include hardness-dependent criteria for the protection of freshwater aquatic life for copper. These criteria for copper are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. Default USEPA translators were used in this Order. The Basin Plan objectives and applicable CTR criteria are as follows:

Table F-12. Water Quality Criteria/Objectives for Copper

Hardness (mg/L as $CaCO_3$)	Water Quality Criterion/Objective (Dissolved/Total Recoverable, µg/L)		
	CTR Acute	CTR Chronic	Basin Plan Maximum
45[2]	[1]	4.5 / 4.7	6.3 / 6.5
56[3]	[1]	5.5 / 5.7	7.6 / 7.9

[1] Footnote x for the acute criterion for copper in the CTR at 40 CFR 131.38(b)(1) states, "*The State of California has adopted and EPA has approved site specific criteria for the Sacramento River (and tributaries) above Hamilton City; therefore, these criteria do not apply*

to these waters." Thus, the acute CTR criterion for copper is not applicable.

[2] Minimum upstream receiving water hardness.

[3] Minimum effluent hardness.

(b) RPA Results. The MEC for copper at Monitoring Location EFF-001 was 8.0 µg/L (total recoverable), based on 29 samples collected between March 2008 and February 2013 (minimum MDL 0.1 µg/L, minimum RL 0.5 µg/L). The MEC for copper at Monitoring Location EFF-002 was 8.5 µg/L (total recoverable), based on 18 samples collected between March 2008 and February 2013 (minimum MDL 0.1 µg/L, minimum RL 0.6 µg/L). The maximum observed upstream receiving water copper concentration was 4.1 µg/L (minimum MDL 0.1 µg/L, minimum RL 0.5 µg/L). The applicable MLs contained in Appendix 4 of the SIP are 0.5 µg/L and 2 µg/L. Section 1.3, Step 4 of the SIP states that if the MEC is greater than or equal to the applicable criteria, an effluent limitation is required. Therefore, copper in the discharge has a reasonable potential to cause or contribute to an exceedance above the CTR criterion for the protection of freshwater aquatic life and the Basin Plan objective.

(c) WQBELs. This Order contains a final AMEL and MDEL of 5.1 µg/L and 7.9 µg/L, respectively based on the CTR criteria for the protection of freshwater aquatic life and the Basin Plan objective.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 8.5 µg/L is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. 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. Therefore, a compliance time schedule for compliance with the total recoverable copper effluent limitations is established in TSO No. R5-2014-0053 in accordance with Water Code section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with Water Code section 13263.3.

~~v.~~iv. Diazinon and Chlorpyrifos

(a) WQO. The Central Valley Water Board recently completed a TMDL for diazinon and chlorpyrifos in the Sacramento and Feather Rivers and amended the Basin Plan to include diazinon and chlorpyrifos waste load allocations and water quality objectives. The Basin Plan Amendment for the Control of Diazinon and Chlorpyrifos was adopted by the Central Valley Water Board on 21 October 2005 and was approved by the State Water Board on 2 May 2006. The Basin Plan amendment was approved by the Office of Administrative Law on 30 June 2006 and is now State law. The amendment was approved by USEPA and went into effect on 20 December 2006.

The amendment modifies the Basin Plan Chapter III (Water Quality Objectives) to establish site specific numeric objectives for chlorpyrifos and diazinon in the

Sacramento and Feather Rivers. The amendment also "*...identifies the requirements to meet the additive formula already in Basin Plan Chapter IV (implementation), for the additive toxicity of diazinon and chlorpyrifos.*"

The amendment provides that: "*The Waste Load Allocations (WLA) for all NPDES-permitted dischargers... shall not exceed the sum (S) of one (1) ad defined below.*

$$S = \frac{CD}{WQOD} + \frac{Cc}{WQOc} \leq 1.0$$

where:

C_D = diazinon concentration in µg/L of the point source discharge...
C_C = chlorpyrifos concentration in µg/L of the point source discharge... WQ_{OD} = acute or chronic diazinon water quality objective in µg/L.
WQ_{OC} = acute or chronic chlorpyrifos water quality objective in µg/L.

Available samples collected within the applicable averaging period for the water quality objective will be used to determine compliance with the allocations and loading capacity. For purposes of calculating the sum (S) above, analytical results that are reported as 'non detectable' concentrations are considered to be zero."

(b) RPA Results. Effluent and receiving water data for the Facility is not available. However, the waste load allocation applies to all NPDES discharges. As stated above, chlorpyrifos and diazinon have been identified as constituents of concern in the Sacramento River, to which the discharge is hydraulically connected.

(c) WQBELs. An AMEL and MDEL have been calculated using the procedures in Section 1.4 of the SIP and consistent with the TMDL waste load allocation resulting in the following effluent limits for chlorpyrifos and diazinon.

<u>Average Monthly Effluent Limitation</u>

$$S_{AMEL} = \frac{CD-avg}{0.079} + \frac{Cc-avg}{0.012} \leq 1.0$$

$C_{D\text{-}avg}$ = average monthly diazinon effluent concentration in µg/L
$C_{C\text{-}avg}$ = average monthly chlorpyrifos effluent concentration in µg/L

<u>Maximum Daily Effluent Limitation</u>

$$S_{MDEL} = \frac{CD-max}{0.079} + \frac{Cc-max}{0.012} \leq 1.0$$

$C_{D\text{-}max}$ = maximum daily diazinon effluent concentration in µg/L
$C_{C\text{-}max}$ = maximum daily chlorpyrifos effluent concentration in µg/L

(d) **Plant Performance and Attainability.** No data is available from the Facility to indicate the presence or absence of chlorpyrifos and diazinon. It is unlikely that chlorpyrifos and diazinon will be detected at concentrations exceeding applicable water quality objectives as sales of all non-agricultural uses of diazinon were banned on 31 December 2004 and sales of the majority of non-agricultural uses of chlorpyrifos were banned in December 2001. The Discharger does not add chlorpyrifos or diazinon to the treatment process. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

~~vi.~~v. Dichlorobromomethane

(a) **WQO.** The CTR includes a criterion of 0.56 µg/L for dichlorobromomethane for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** The MEC for dichlorobromomethane at Monitoring Location EFF-001 was 3.6 µg/L based on 26 samples collected from March 2008 through February 2013 (minimum MDL 0.05 µg/L, minimum RL 0.5 µg/L). The MEC for dichlorobromomethane at Monitoring Location EFF-002 was 0.8 µg/L based on 17 samples collected from March 2008 through February 2013 (minimum MDL 0.08 µg/L, minimum RL 0.5 µg/L). The maximum observed upstream receiving water concentration was 1.0 µg/L based on 18 samples collected between March 2008 and February 2013 (minimum MDL 0.08 µg/L, minimum RL 0.5 µg/L). The applicable ML contained in Appendix 4 of the SIP for dichlorobromomethane is 0.5 µg/L. Section 1.3, Step 4 of the SIP states that if the MEC is greater than or equal to the applicable criteria, an effluent limitation is required. Therefore, dichlorobromomethane in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) **WQBELs.** This Order contains a final AMEL and MDEL for dichlorobromomethane of 0.56 µg/L and 1.4 µg/L, respectively, based on the CTR criterion for the protection of human health.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 3.6 µg/L is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. 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. Therefore, a compliance time schedule for compliance with the dichlorobromomethane effluent limitations is established in TSO No. R5-2014-0053 in accordance with Water Code section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with Water Code section 13263.3.

~~vii.~~vi. Nitrite Plus Nitrate

(a) **WQO.** DPH has adopted Primary MCLs for the protection of human health for nitrite and nitrate that are equal to 1 mg/L and 10 mg/L (measured as nitrogen), respectively. DPH has also adopted a primary MCL of 10 mg/L for the sum of nitrate and nitrite, measured as nitrogen.

USEPA has developed a Primary MCL and an MCL goal of 1 mg/L for nitrite (as nitrogen). For nitrate, USEPA has developed Drinking Water Standards (10 mg/L as Primary MCL) and NAWQC for protection of human health (10 mg/L for non-cancer health effects). Recent toxicity studies[1] have indicated a possibility that nitrate is toxic to aquatic organisms.

(b) **RPA Results.** The maximum effluent nitrate concentration at Monitoring Location EFF-001 was 16 mg/L based on 24 samples collected from March 2008 through February 2013 . The maximum effluent nitrate concentration at Monitoring Location EFF-002 was 7.32 mg/L based on 17 samples collected from March 2008 through February 2013. The maximum observed upstream receiving water nitrate concentration was 1.16 mg/L based on 14 samples collected between March 2008 and February 2013. Therefore, based on monitoring data, nitrate in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Primary MCL. Effluent and upstream receiving water data for nitrite is not available.

(c) **WQBELs.** This Order contains a final AMEL for nitrate plus nitrite of 10 mg/L (total as N), based on the Primary MCL. 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. Order R5-2008-0037 did not establish an effluent limitation for nitrate plus nitrite, but did establish an effluent limitation for nitrate (as N). This Order replaces the nitrate (as N) effluent limitation with the effluent limitation for nitrate plus nitrite.

(d) **Plant Performance and Attainability.** Sufficient effluent and receiving water data for the nitrate plus nitrite is not available; however, analysis of the effluent data shows that the MEC of 16 µg/L for nitrate (as N) is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. 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. Furthermore, the effluent limitations for nitrate plus nitrite are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was

[1] Camargo, Julio A., Alvaro Alonso, Annabella Salamanca, "Nitrate toxicity to aquatic animals: a review with new data for freshwater invertebrates". Accepted 25 October 2004-Chemosphere 58 (2005) 1255-1267; Canadian Council of Ministers of the Environment, National Guidelines and Standards Office, "Canadian Water Quality Guidelines for the Protection of Aquatic Life". 2012; Minnesota Pollution Control Agency, "Developing Surface Water Nitrate Standards and Strategies for Reducing Nitrogen Loading". December 2010.

adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the nitrate plus nitrite effluent limitations is established in TSO No. R5-2014-0053 in accordance with Water Code section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with Water Code section 13263.3.

~~viii.~~vii. Pathogens

(a) WQO. DPH has developed reclamation criteria, CCR, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, schoolyards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent total coliform levels not exceed 2.2 MPN/100 mL as a 7-day median; 23 MPN/100 mL, not to be exceeded more than once in a 30-day period; and 240 MPN/100 mL, at any time.

Title 22 also requires that recycled water used as a source of water supply for non-restricted recreational impoundments be disinfected tertiary recycled water that has been subjected to conventional treatment. A non-restricted recreational impoundment is defined as *"...an impoundment of recycled water, in which no limitations are imposed on body-contact water recreational activities."* Title 22 is not directly applicable to surface waters; however, the Central Valley Water Board finds that it is appropriate to apply an equivalent level of treatment to that required by DPH's reclamation criteria because the receiving water is used for irrigation of agricultural land and for contact recreation purposes. The stringent disinfection criteria of Title 22 are appropriate since the undiluted effluent may be used for the irrigation of food crops and/or for body-contact water recreation. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens.

(b) RPA Results. Raw domestic wastewater inherently contains human pathogens that threaten human health and life, and constitute a threatened pollution and nuisance under CWC Section 13050 if discharged untreated to the receiving water. Reasonable potential for pathogens therefore exists and WQBELs are required.

Federal regulations at 40 CFR 122.44(d)(1)(i) require that, "*Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*" For priority pollutants, the SIP dictates the procedures for conducting the RPA. Pathogens are not priority pollutants. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used professional judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent.

USEPA's September 2010 NPDES Permit Writer's Manual, page 6-30, states, "*State implementation procedures might allow, or even require, a permit writer to determine reasonable potential through a qualitative assessment process without using available facility-specific effluent monitoring data or when such data are not available…A permitting authority might also determine that WQBELs are required for specific pollutants for all facilities that exhibit certain operational or discharge characteristics (e.g., WQBELs for pathogens in all permits for POTWs discharging to contact recreational waters).*" USEPA's TSD also recommends that factors other than effluent data should be considered in the RPA, "*When determining whether or not a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criterion for individual toxicants or for toxicity, the regulatory authority can use a variety of factors and information where facility-specific effluent monitoring data are unavailable. These factors also should be considered with available effluent monitoring data.*" (TSD, p. 50)

The beneficial uses of Churn Creek include municipal and domestic supply, water contact recreation, and agricultural irrigation supply, and there is, at times, less than 20:1 dilution. To protect these beneficial uses, the Central Valley Water Board finds that the wastewater must be disinfected and adequately treated to prevent disease. Although the Discharger provides disinfection, inadequate or incomplete disinfection creates the potential for pathogens to be discharged. Therefore, the Central Valley Water Board finds the discharge has reasonable potential for pathogens and WQBELs are required.

(c) **WQBELs.** In accordance with the requirements of Title 22, this Order includes effluent limitations for total coliform organisms of 2.2 MPN/100 mL as a 7-day median; 23 MPN/100 mL, not to be exceeded more than once in a 30-day period; and 240 MPN/100 mL as an instantaneous maximum.

The tertiary treatment process, or equivalent, is capable of reliably treating wastewater to a turbidity level of 2 nephelometric turbidity units (NTU) as a daily average. Failure of the filtration system such that virus removal is impaired would normally result in increased particles in the effluent, which result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance. Coliform testing, by comparison, is not conducted continuously and requires several hours, to days, to identify high coliform concentrations. Therefore, to ensure compliance with the DPH recommended Title 22 disinfection criteria, weekly average specifications are impracticable for turbidity. This Order includes operational specifications for turbidity of 2 NTU as a daily average; 5 NTU, not to be exceeded more than 5 percent of the time within a 24-hour period; and 10 NTU as an instantaneous maximum.

This Order contains effluent limitations for BOD_5, total coliform organisms, and TSS, and requires a tertiary level of treatment, or equivalent, necessary to protect the beneficial uses of the receiving water. The Central Valley Water Board has previously considered the factors in Water Code section 13241 in establishing these requirements.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 2 MPN/100 mL is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

~~ix.~~viii. pH

(a) WQO. 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."*

(b) RPA Results. Raw domestic wastewater inherently has variable pH that if not properly controlled would violate the Basin Plan's numeric objective for pH in the receiving water Therefore, reasonable potential exists and WQBELs for pH are required.

Federal regulations at 40 CFR §122.44(d)(1)(i) requires that, "*Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*" For priority pollutants, the SIP dictates the procedures for conducting the RPA. pH is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used professional judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent.

USEPA's September 2010 NPDES Permit Writer's Manual, page 6-30, states, "*State implementation procedures might allow, or even require, a permit writer to determine reasonable potential through a qualitative assessment process without using available facility-specific effluent monitoring data or when such data are not available...A permitting authority might also determine that WQBELs are required for specific pollutants for all facilities that exhibit certain operational or discharge characteristics (e.g., WQBELs for pathogens in all permits for POTWs discharging to contact recreational waters).*" USEPA's TSD also recommends that factors other than effluent data should be considered in the RPA, "*When determining whether or not a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criterion for individual toxicants or for toxicity, the regulatory authority can use a variety of factors and information where facility-specific effluent monitoring data are unavailable. These factors also should be considered with available effluent monitoring data.*" (TSD, p. 50)

The Facility is a POTW that treats domestic wastewater. Based on 569 samples collected at Monitoring Location EFF-001 from March 2008 to February 2013, the maximum pH reported was 7.39 and the minimum was 6.01. Although the Discharger has proper pH controls in place, the pH for the Facility's influent

varies due to the nature of municipal sewage, which provides the basis for the discharge to have a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's numeric objective for pH in the receiving water. Therefore, WQBELs for pH are required in this Order.

(c) **WQBELs.** Effluent limitations for pH of 6.5 as an instantaneous minimum and 8.5 as an instantaneous maximum are included in this Order based on protection of the Basin Plan objectives for pH.

(d) **Plant Performance and Attainability.** Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. 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. Therefore, a compliance time schedule for compliance with the pH effluent limitations is established in TSO No. R5-2014-0053 in accordance with Water Code section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with Water Code section 13263.3.

~~x.~~ix. Zinc, Total Recoverable

(a) **WQO.** The Basin Plan and CTR include hardness-dependent criteria for the protection of freshwater aquatic life for zinc. These criteria for zinc are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. Default USEPA translators were used in this Order. The Basin Plan objectives and applicable CTR criteria are as follows:

Table F-13. Water Quality Criteria/Objectives for Zinc

Hardness (mg/L as $CaCO_3$)	Water Quality Criterion/Objective (Dissolved/Total Recoverable, µg/L)		
	CTR Acute[1]	CTR Chronic	Basin Plan Maximum
45[2]	60 / 61	60 / 61	18 / 18
56[3]	72 / 73	72 / 73	21 / 22

1 Footnote x for the acute criterion for zinc in the CTR at 40 CFR 131.38(b)(1) states, "*The State of California has adopted and EPA has approved site specific criteria for the Sacramento River (and tributaries) above Hamilton City; therefore, these criteria do not apply to these waters.*" Thus, the acute CTR criterion for zinc is not applicable.

2 Minimum upstream receiving water hardness.

3 Minimum effluent hardness.

(b) **RPA Results.** The MEC for zinc at Monitoring Location EFF-001 was 37.6 µg/L based on 24 samples collected between March 2008 and February 2013 (minimum MDL 0.4 µg/L, minimum RL 2.0 µg/L). The MEC for zinc at Monitoring Location EFF-002 was 36.5 µg/L based on 19 samples collected between March 2008 and February 2013 (minimum MDL 0.5 µg/L, minimum RL 2.0 µg/L).The maximum observed upstream receiving water zinc concentration was 24.2 µg/L (total recoverable), based on 18 samples collected between March 2008 and February 2013 (minimum MDL 0.4 µg/L, minimum RL 2.0 µg/L).

The applicable MLs contained in Appendix 4 of the SIP are 1 µg/L and 10 µg/L. Section 1.3, Step 4 of the SIP states that if the MEC is greater than or equal to the applicable criteria, an effluent limitation is required. Therefore, zinc in the discharge has a reasonable potential to cause or contribute to an exceedance above the CTR criterion for the protection of freshwater aquatic life and the Basin Plan objective.

(c) **WQBELs.** This Order contains a final AMEL and MDEL of 12 µg/L and 22 µg/L, respectively based on the CTR criteria for the protection of freshwater aquatic life and the Basin Plan objective.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 37.6 µg/L is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. 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. Therefore, a compliance time schedule for compliance with the total recoverable zinc effluent limitations is established in TSO No. R5-2014-0053 in accordance with Water Code section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with Water Code section 13263.3.

6. **WQBEL Calculations**

a. This Order includes WQBELs for ammonia~~, chlorine residual~~, copper, diazinon and chlorpyrifos, dichlorobromomethane, nitrate plus nitrite, pathogens, pH, and zinc. The general methodology for calculating WQBELs based on the different criteria/objectives is described in subsections IV.C.4.c through f, below. See Attachment H for the WQBEL calculations.

b. **Effluent Concentration Allowance.** For each water quality criterion/objective, the ECA is calculated using the following steady-state mass balance equation from Section 1.4 of the SIP:

$$ECA = C + D(C - B) \quad \text{where } C>B, \text{ and}$$
$$ECA = C \quad \text{where } C \leq B$$

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 health from carcinogenic effects shall use the arithmetic mean concentration of the ambient

background samples. For ECAs based on MCLs, which implement the Basin Plan's chemical constituents objective and are applied as annual averages, an arithmetic mean is also used for B due to the long-term basis of the criteria.

c. **Basin Plan Objectives and MCLs.** For WQBELs based on site-specific numeric Basin Plan objectives or MCLs, the effluent limitations are applied directly as the ECA as either an MDEL, AMEL, or average annual effluent limitations, depending on the averaging period of the objective.

d. **Aquatic Toxicity Criteria.** WQBELs based on acute and chronic aquatic toxicity criteria are calculated in accordance with Section 1.4 of the SIP. The ECAs are converted to equivalent long-term averages (i.e., LTA_{acute} and $LTA_{chronic}$) using statistical multipliers and the lowest LTA is used to calculate the AMEL and MDEL using additional statistical multipliers.

e. **Human Health Criteria.** WQBELs based on human health criteria, are also calculated in accordance with Section 1.4 of the SIP. The ECAs are set equal to the AMEL and a statistical multiplier was used to calculate the MDEL.

$$AMEL = mult_{AMEL}\left[\min\left(\overbrace{M_A ECA_{acute}}^{LTA_{acute}}, M_C ECA_{chronic}\right)\right]$$

$$MDEL = mult_{MDEL}\left[\min\left(M_A ECA_{acute}, \underbrace{M_C ECA_{chronic}}_{LTA_{chronic}}\right)\right]$$

$$MDEL_{HH} = \left(\frac{mult_{MDEL}}{mult_{AMEL}}\right) AMEL_{HH}$$

where:
$mult_{AMEL}$ = statistical multiplier converting minimum LTA to AMEL
$mult_{MDEL}$ = statistical multiplier converting minimum LTA to MDEL
M_A = statistical multiplier converting acute ECA to LTA_{acute}
M_C = statistical multiplier converting chronic ECA to $LTA_{chronic}$

Summary of Water Quality-Based Effluent Limitations
Discharge Points 001 and 002

Table F-14. Summary of Water Quality-Based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Conventional Pollutants						
Biochemical Oxygen Demand (5-day @ 20°C)	mg/L	10	15	30	--	--
	lbs/day[1]	108	163	325	--	--

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
pH	standard units	--	--	--	6.5	8.5
Total Suspended Solids	mg/L	10	15	30	--	--
	lbs/day[1]	108	163	325	--	--
Priority Pollutants						
Copper, Total Recoverable	µg/L	5.1	--	7.9	--	--
Dichlorobromomethane	µg/L	0.56	--	1.4	--	--
Zinc, Total Recoverable	µg/L	12	--	22	--	--
Non-Conventional Pollutants						
Ammonia Nitrogen, Total (as N)	mg/L	0.74	--	2.1	--	--
	lbs/day[1]	8.0	--	23	--	--
~~Chlorine, Total Residual~~	~~mg/L~~	~~0.011[3]~~	~~--~~	~~0.019[3]~~	--	--
Diazinon and Chlorpyrifos	µg/L	[4]	--	[5]	--	--
Nitrite Plus Nitrate (as N)	mg/L	10	--	--	--	--
Total Coliform Organisms	MPN/100 mL	2.2[6]	23[7]	--	--	240

[1] Based on a dry weather flow of 1.3 MGD.

~~[3] Applied as a 4-day average limitation.~~

~~[3] Applied as a 1-hour average limitation.~~

[42] $S_{avg} = \frac{C_{D\ avg}}{0.079} + \frac{C_{C\ avg}}{0.012} \leq 1.0$

$C_{D\text{-}avg}$ = average monthly diazinon effluent concentration in µg/L
$C_{C\text{-}avg}$ = average monthly chlorpyrifos effluent concentration in µg/L

[53] $S_{max} = \frac{C_{D\ max}}{0.16} + \frac{C_{C\ max}}{0.025} \leq 1.0$

$C_{D\text{-}avg}$ = maximum daily diazinon effluent concentration in µg/L
$C_{C\text{-}avg}$ = maximum daily chlorpyrifos effluent concentration in µg/L

[64] Applied as a 7-day median effluent limitation.

[75] Not to exceed more than once in any 30-day period.

7. Whole Effluent Toxicity (WET)

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

a. **Acute Aquatic Toxicity.** The Basin Plan contains a narrative toxicity objective that states, "*All waters shall be maintained free of toxic substances in concentrations that*