

**APPENDIX E -
NUMERIC WATER QUALITY CRITERIA AND
NARRATIVE WATER QUALITY CRITERIA**

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NUMERIC CRITERIA

The term numeric criteria is used in the Table 4.6-4 of the SSP Draft EIR, Chapter 4.6 *Surface Water Quality* to represent any criteria, objectives, primary maximum contaminate levels (MCLs), secondary maximum contaminate levels (Secondary MCLs), and notification levels promulgated for the State of California. For this evaluation, numeric criteria are divided into two categories – criteria developed for the protection of aquatic organisms and criteria developed to protect human health and/or drinking water supplies. Numeric criteria for the protection of aquatic organisms are based on the California Toxics Rule and Basin Plan numeric criteria. Organisms in the receiving water will be exposed to recycled/stored recycled water for varying lengths of time. For this reason, the chronic criteria (criterion continuous concentration) were used where available since these are more stringent than acute criteria.

Human health and/or drinking water criteria are designed to protect human health (MCLs, notification and response levels) but also to regulate the aesthetic qualities of drinking water (Secondary MCLs). MCLs for *Giardia*, viruses, and *Cryptosporidium* are expressed in terms of drinking water filtration plant efficiency and drinking water supplier procedures and therefore are not evaluated in this EIR.

The California Toxics Rule (CTR) criteria, and drinking water primary MCLs, secondary MCLs, and notification levels are shown in Table E-1 and Table E-2 (fluoride). The criteria are shown in Table E-1 for organic constituents are only for those organic constituents detected in Santa Rosa's recycled water or stored recycled water.

TABLE E-1
Numeric Water Quality Criteria

Constituent	California Toxics Rule ^a		Human Health Water & Organism	Title 22 ^b			Basin Plan ^c
	Freshwater Aquatic Life			MCL ^f	Secondary MCL	Notification Level (NL)/ Response Level (RL) ^g	
	CMC ^d (Acute)	CCC ^e (Chronic)					
All units in µg/L unless otherwise noted in constituent column							
Inorganics							
Aluminum (mg/L)				1	0.2		1.0
Antimony			14	6			^h
Arsenic	340 ⁱ	150 ⁱ		10 ^j			50
Asbestos fibers (million fibers per liter > 10 µm)			7	7			^h
Barium (mg/L)				1			1.0
Beryllium (mg/L)			^k	0.004			^h
Boron (mg/L)						NL – 1 RL – 10	
Cadmium	4.3 ^l	2.2 ^l	^k	5			10
Chlorate (mg/L)						NL – 0.8 RL – 8.0	
Chloride					250/500/ 600 ^m		
Chromium (III)	550 ⁿ	180 ⁿ	^k				
Chromium (VI)	16 ^o	11 ^o	^k				
Chromium (total)				50			50
Copper	13 ^p	9.0 ^p	1300		1000	1300 ^q	

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Constituent	California Toxics Rule ^a		Human Health Water & Organism	Title 22 ^b			Basin Plan ^c
	Freshwater Aquatic Life			MCL ^f	Secondary MCL	Notification Level (NL)/ Response Level (RL) ^g	
	CMC ^d (Acute)	CCC ^e (Chronic)					
Cyanide (free cyanide)	22	5.2	700	150			h
Fluoride (mg/L)				2.0	See Table 4.6-17		See Table 4.6-17 ^f
Iron (mg/L)					0.3		
Lead	65 ^s	2.5 ^s	k			15 ^q	50
Manganese (mg/L)					0.05	NL - 0.5 RL - 5	h
Mercury	Reserved ^t	Reserved ^t	0.050	2			2
Nickel	470 ^u	52 ^u	610	100			h
Nitrate (as N) (mg/L)				10			10
Nitrite (as N) (mg/L)				1			h
Total Nitrate/Nitrite (as N) (mg/L)				10			h
Selenium	reserved	5.0 ^v	k	50			10
Silver	3.4 ^w				100		50
Sulfate (mg/L)					250/500/ 600 ^m		
Thallium			1.7	2			h
Vanadium					50		
Zinc	120 ^x	120 ^x			5000		

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Constituent	California Toxics Rule ^a		Human Health Water & Organism	Title 22 ^b			Basin Plan ^c
	Freshwater Aquatic Life			MCL ^f	Secondary MCL	Notification Level (NL)/ Response Level (RL) ^g	Water Quality Objective
	CMC ^d (Acute)	CCC ^e (Chronic)					
Organic Compounds Detected in Recycled Water or Stored Recycled Water							
b-BHC			0.014				
Bromodichloromethane (Dichlorobromomethane)			0.56	TTHM Limit ^y			
Chloroform			Reserved	TTHM Limit ^y			
Di-n-Butyl Phthalate			2700				
1,4-Dichlorobenzene			400	5			5
1,4-Dioxane						NL – 3 RL - 300	
Endosulfan Sulfate			110				
Methomyl							
methyl tertiary butyl ether (MTBE)				13	5		^h
Radionuclides							
Gross alpha (pCi/L)				15			15

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	Freshwater Aquatic Life			MCL ^f	Secondary MCL	Notification Level (NL)/ Response Level (RL) ^g	Water Quality Objective
	CMC ^d (Acute)	CCC ^e (Chronic)					
Gross beta (pCi/L)				50 ^{bb}			50
Beta/photon emitters (millirem/yr annual dose equivalent to total body or any internal organ)				4			
Radium-226 and -228 (pCi/L)				5			5
Strontium-90 (pCi/L)				8			8
Tritium (pCi/L)				20,000			20,000
Uranium				20			20
Physical Parameters							
Color (units)					15		Narrative ^{cc}
Odor (Threshold Odor Number)					3		Narrative ^{dd}
Foaming Agents (MBAS) (mg/L)					0.5		
Conductivity (µmho/cm)					900/1600/ 2200 ^{ee}		320/250 375/285 ^{ff}
Total dissolved solids (mg/L)					500/1000/ 1500 ^{ee}		170/150 200/170 ^{ff}

TABLE E-1
Numeric Water Quality Criteria

Constituent	California Toxics Rule ^a		Human Health Water & Organism	Title 22 ^b			Basin Plan ^c
	Freshwater Aquatic Life			MCL ^f	Secondary MCL	Notification Level (NL)/ Response Level (RL) ^g	Water Quality Objective
	CMC ^d (Acute)	CCC ^e (Chronic)					
Turbidity (NTU)					5		Narrative ^{gg} (≤ 20% increase)
pH							8.5 - 6.5; no changes > 0.5 units in WARM or COLD beneficial use waters
Dissolved Oxygen (mg/L)							7.0/ 7.5 /10 ^{hh}
Temperature							ii
Bacteria^{jj}							
Fecal Coliforms							Median < 50/100ml for any 30 day period or < 10% of samples > 400/100ml for any 30 day period (REC1) ^{kk} 43/100 mL (tube dilution test) and 49/100 mL (3 tube dilution test) (SHELL) ^{ll}
Total coliforms (mpn/100 mL)				5.0% positive _{mm}			

Notes:

- a. USEPA, 2000. 40 CFR 131. Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State Of California. Federal Register Volume 65, No. 97. May 18, 2000.
- b. CDPH, 2006a. Title 22, California Code of Regulations, Division 4, Environmental Health, Chapter 15 Domestic Water Quality and Monitoring, September 27, 2006. and CDPH, 2006b. Drinking Water Notification and Response Levels: An overview. CDPH, Drinking Water Program. June 28, 2006.
- c. NCRWQCB, 2007a. Water Quality Control Plan for the North Coast Region, Santa Rosa, CA. January 2007.
- d. Criterion Maximum Concentration
- e. Criterion Continuous Concentration
- f. Maximum Contaminant Level
- g. If a chemical concentration is greater than the notification level, DHS recommends the water system notify its customers of the presence of the chemical and the health concerns of exposure to it. If the chemical concentration exceeds the response level, DHS recommends the water system remove the source from service.
- h. The Basin Plan contains a narrative that waters designated for use as domestic or municipal supply (MUN) should not contain concentrations of chemical constituents in excess of the limits specified in California Code of Regulations, Title 22, Chapter 15, Division 4, Article 4, Section 64435 (Tables 2 and 3) and Section 64444.5 (Table 5) and listed in Table 3-2 of this plan. This constituent has an associated Title 22 MCL
- i. Arsenic criteria are expressed as a function of the water-effect ratio (WER). The default WER is 1. CMC and CCC are expressed in the CTR as dissolved criteria.
Acute criterion = $WER \times (\text{Acute CF}) \times \text{CMC}$
Chronic criterion = $WER \times (\text{Chronic CF}) \times \text{CCC}$
- j. The 10- $\mu\text{g/L}$ federal MCL for arsenic became effective January 23, 2006. The state MCL cannot be less restrictive than the 10- $\mu\text{g/L}$ federal MCL. The state is in the process of revising the arsenic standard
- k. USEPA did not promulgate numeric criteria; the CTR directs the permitting authority to address these contaminants through narrative criteria.
- l. Cadmium criteria are expressed as a function of hardness and WER. The default WER is 1. Values shown in the table are based on a hardness of 100 mg/L.
CMC and CCC are expressed in the CTR as dissolved criteria.
Acute criterion = $WER \times (\text{Acute CF}) \times (\exp\{1.128[\ln(\text{hardness})] - 3.6867\})$
Chronic criterion = $WER \times (\text{Chronic CF}) \times (\exp\{0.7852[\ln(\text{hardness})] - 2.715\})$
- m. These criteria are expressed as ranges: recommended / upper / short term.
- n. Chromium III criteria are expressed as a function of hardness and the water-effect ratio (WER). The default WER is 1. Values shown in the table are based on a hardness of 100 mg/L.
CMC and CCC are expressed in the CTR as dissolved criteria.
Acute criterion = $WER \times (\text{Acute CF}) \times (\exp\{0.8190[\ln(\text{hardness})] + 3.688\})$
Chronic criterion = $WER \times (\text{Chronic CF}) \times (\exp\{0.8190[\ln(\text{hardness})] + 1.561\})$
- o. Chromium VI criteria are expressed as a function of the water-effect ratio (WER). The default WER is 1. CMC and CCC are expressed in the CTR as dissolved criteria.
- p. Copper criteria are expressed as a function of hardness and the water-effect ratio (WER). The default WER is 1. Values shown in the table are based on a hardness of 100 mg/L. CMC and CCC are expressed in the CTR as dissolved criteria.
Acute criterion = $WER \times (\text{Acute CF}) \times (\exp\{0.9422[\ln(\text{hardness})] - 1.700\})$
Chronic criterion = $WER \times (\text{Chronic CF}) \times (\exp\{0.8545[\ln(\text{hardness})] - 1.702\})$
- q. These are action levels. If the 90th percentile of samples collected from the consumers tap exceeds the action level, the action level, the water supplier is required to additional steps to control corrosion of plumbing materials.
- r. If more than 20percent of the samples collected in a month fall out of the optimum range, the system is out of compliance.
- s. Lead criteria are expressed as a function of hardness and of the water-effect ratio (WER). The default WER is 1. Values shown in the table are based on a hardness of 100 mg/L. CMC and CCC are expressed in the CTR as dissolved criteria.

- Acute criterion = $WER \times (Acute\ CF) \times (\exp\{1.273[\ln(hardness)] - 1.460\})$
Chronic criterion = $WER \times (Chronic\ CF) \times (\exp\{1.273[\ln(hardness)] - 4.705\})$
- t. CMC and CCC are currently reserved and will be expressed as dissolved criteria when promulgated.
 - u. Nickel criteria are expressed as a function of hardness and the water-effect ratio (WER). The default WER is 1. Values shown in the table are based on a hardness of 100 mg/L. CMC and CCC are expressed in the CTR as dissolved criteria.
Acute criterion = $WER \times (Acute\ CF) \times (\exp\{0.8460[\ln(hardness)] + 2.255\})$
Chronic criterion = $WER \times (Chronic\ CF) \times (\exp\{0.8460[\ln(hardness)] + 0.0584\})$
 - v. This criterion is expressed in the total recoverable form
 - w. The silver criterion is expressed as a function of hardness and the water-effect ratio (WER). The default WER is 1. The value shown in the table is based on a hardness of 100 mg/L. CMC is expressed in the CTR as dissolved criteria.
Acute criterion = $WER \times (Acute\ CF) \times (\exp\{1.72[\ln(hardness)] - 6.52\})$
 - x. Zinc criteria are expressed as a function of hardness and the water-effect ratio (WER). The default WER is 1. Values shown in the table are based on a hardness of 100 mg/L. CMC and CCC are expressed in the CTR as dissolved criteria.
Acute criterion = $WER \times (Acute\ CF) \times (\exp\{0.8473[\ln(hardness)] + 0.884\})$
Chronic criterion = $WER \times (Chronic\ CF) \times (\exp\{0.8473[\ln(hardness)] 0.884\})$
 - y. The limitation for Total trihalomethanes (TTHM) is 0.080 mg/L. TTHMs include Bromodichloromethane, Bromoform, Chloroform, and Dibromochloromethane.
 - z. Naphthalene is a CTR constituent, but has no criteria associated with it.
 - aa. CDPH is currently proposing a MCL for perchlorate of 0.006 mg/L or 6 µg/L.
 - bb. Screening level
 - cc. Waters shall be free from coloration that causes nuisance or adversely impacts beneficial uses.
 - dd. Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, or that cause nuisance or adversely affect beneficial uses. Numeric WQOs with regards to taste and odor thresholds have been developed by the State DHS and the USEPA. These numeric objectives, as well as those available in the technical literature, are incorporated into waste discharge requirements and cleanup and abatement orders as appropriate.
 - ee. These criteria are expressed as ranges: recommended / upper / short term.
 - f. 90percent upper limit (90th percentile of values for a calendar year) and 50 percent upper limit (50th percentile of monthly means for a calendar year). Top set represents Mainstem Russian River upstream of confluence with Laguna de Santa Rosa, bottom set represents Mainstem Russian River downstream of confluence with Laguna de Santa Rosa.
 - gg. Turbidity shall not be increased more than 20 percent above naturally occurring background levels. Allowable zones of dilution with which higher percentages can be tolerated may be defined for specific discharges upon the issuance of discharge permits or waiver thereof.
 - hh. Minimum, 90 percent lower limit (90th percentile of values for a calendar year) and 50 percent lower limit (50th percentile of monthly means for a calendar year).
 - ii. The receiving water limitations for temperature in the Subregional System's NPDES discharge permit are more restrictive than the Basin Plan objective. Therefore the permit limitations are used in this document for temperature criteria. The permit limitations are as follows:
The following temperature limitations apply to the discharge to the receiving waters:
 - a. When the receiving water is below 58°F, the discharge shall cause an increase of no more than 4°F in the receiving water, and shall not increase the temperature of the receiving water beyond 59°F. No instantaneous increase in receiving water temperature shall exceed 4°F at any time.
 - b. When the receiving water is between 59°F and 67°F, the discharge shall cause an increase of no more than 1°F in the receiving water. No instantaneous increase in receiving water temperature shall exceed 1°F at any time.
 - c. When the receiving water is above 68°F, the discharge shall not cause an increase in temperature of the receiving water.

- jj. The drinking water regulations for other microorganisms, specifically, Giardia, Cryptosporidium, and viruses, are drinking water treatment standards. Therefore, they are not addressed in this report. See Public Health Risk Assessment
- kk. REC1 – objectives apply to waters with a Recreation 1 beneficial use designation
- ll. SHELL – objectives apply to waters with a Shellfish Harvesting beneficial use designation. This Basin Plan objective is from the National Shellfish Sanitation Program Manual of Operations. Part 1 Sanitation of Shellfish Growing Areas, page C-8. This document states that Approved Areas will show satisfactory compliance when:
“The fecal coliform median or geometric mean MPN of the water does not exceed 14 per 100 ml and not more than 10 percent of the samples exceed an MPN of 43 per 100 ml for a 5-tube decimal dilution test (or an MPN of 49 per 100 ml for a 3-tube decimal dilution test).”
- mm. Satisfactory Compliance
This item will be satisfied when:
A public water system is in violation of the total coliform MCL when:
 - (a) For a public water system which collects at least 40 samples per month, more than 5.0 percent of the samples collected during any month are total coliform-positive; or
 - (b) For a public water system which collects fewer than 40 samples per month, more than one sample collected during any month is total coliform-positive; or
 - (c) Any repeat sample is fecal coliform-positive or E. coli-positive; or
 - (d) Any repeat sample following a fecal coliform-positive or E. coli-positive routine sample is total coliform-positive.

TABLE E-2
Fluoride Ranges in Title 22 and the Basin Plan

Average Annual of Maximum Daily Air Temperature, °F	Title 22			Basin Plan			
	Low	Optimal	High	Lower	Optimum	Upper	MCL
50.0 to 53.7	1.1	1.2	1.7	0.9	1.2	1.7	2.4
53.8 to 58.3	1.0	1.1	1.6	0.8	1.1	1.5	2.2
58.4 to 63.8	0.9	1.0	1.5	0.8	1.0	1.3	2.0
63.9 to 70.6	0.8	0.9	1.4	0.7	0.9	1.2	1.8
70.7 to 79.2	0.7	0.8	1.3	0.7	0.8	1.0	1.6
79.3 to 90.5	0.6	0.7	1.2	0.6	0.7	0.8	1.4

Narrative Criteria

The narrative criteria from the Basin Plan used to evaluate Seasonal Storage Project impacts on water quality are outlined in Table E-3.

TABLE E-3
Basin Plan Narrative Criteria Used in Evaluation of Impacts on Water Quality

Advanced Treated Wastewater	The discharge of municipal waste during October 1 through May 14 shall be of advanced treated wastewater in accordance with effluent limitations contained in NPDES permits for each affected discharger.
Chemical Constituents	Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the limits specified in California Code of Regulations, Title 22, Chapter 15, Division 4, Article 4, Section 64435 (Tables 4.6-3 and 4.6-4), and Section 64444.5 (Table 4.6-6), and listed in Table 3-2 of the Basin Plan. Waters designated for use as agricultural supply (AGR) shall not contain concentrations of chemical constituents in amounts which adversely affect such beneficial use. Numerical water quality objectives for individual waters are contained in Table 3-1 of the Basin Plan.
Color	Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.
Tastes and Odors	Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.
Floating Material	Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations that cause nuisance or adversely affect beneficial uses.

TABLE E-3
Basin Plan Narrative Criteria Used in Evaluation of Impacts on Water Quality

Suspended Material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Settleable Material	Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.
Biostimulatory Substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Toxicity	<p>All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by the use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board. The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary for other control water that is consistent with the requirements for “experimental water” as described in Standard Methods for the Examination of Water and Wastewater, 18th Edition (1992). As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay.</p> <p>In addition, effluent limits based upon acute bioassays of effluents will be prescribed. Where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.</p>
Pesticides	<p>No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no bioaccumulation of pesticide concentrations found in bottom sediments or aquatic life.</p> <p>Waters designated for use as domestic or municipal supply shall not contain concentrations of pesticides in excess of the limiting concentrations set forth in California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64444.5 (Table 4.6-6) and listed in Table 3-2 of the Basin Plan.</p>
Seasonal Discharge Limitation	The discharge of municipal waste to the Russian River and its tributaries shall be limited to October 1 through May 14.

TABLE E-3
Basin Plan Narrative Criteria Used in Evaluation of Impacts on Water Quality

<p>Discharge Rate Limitation</p>	<p>The discharge of municipal waste shall be limited to one percent of the receiving flow for the Russian River and its tributaries.</p> <p>The Regional Water Board will consider exceptions for cause to the waste discharge rate limitations. Exceptions shall be defined in NPDES permits for each discharger, on a case by case basis, and in accordance with the following:</p> <p>A. The wastewater treatment facility shall be reliable. Reliability shall be demonstrated through analysis of the features of the facility including, but not limited to, system redundancy, proper operation and maintenance, and backup storage capacity to prevent the threat of pollution or nuisance.</p> <p>B. The discharge of waste shall be limited to rates and constituent levels which protect the beneficial uses of the receiving waters. Protection shall be demonstrated through analysis of all the beneficial uses of the receiving waters. For receiving waters which support domestic water supply (MUN) and water contact recreation (REC1), analysis shall include expected normal and extreme weather conditions within the discharge period, including estimates of instantaneous and long-term minimum, average, and maximum discharge flows and percent dilution in receiving waters. The analysis shall evaluate and address cumulative effects of all discharges, including point and nonpoint source contributions, both in existence and reasonably foreseeable. For receiving waters which support domestic water supply (MUN), the Regional Water Board shall consider the California Department of Health Services evaluation of compliance with the Surface Water Filtration and Disinfection Regulations contained in Section 64650 through 64666, Chapter 17, Title 22 of the California Code of Regulations. Demonstration of protection of beneficial uses shall include consultation with the California Department of Fish and Game regarding compliance with the California Endangered Species Act.</p> <p>C. The exception shall be limited to that increment of wastewater which remains after reasonable alternatives for reclamation have been addressed.</p> <p>D. The exception shall comply with State Water Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality Waters in California," and the federal regulations covering antidegradation (40 CFR §131.12).</p> <p>E. There shall be no discharge of waste during the period May 15 through September 30.</p>
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