

**DEVELOPMENT OF
EVALUATION CRITERIA FOR POTENTIAL
WATER QUALITY IMPACTS**

**SANTA ROSA SUBREGIONAL
LONG-TERM WASTEWATER PROJECT**

Prepared for
**City of Santa Rosa
and
U.S. Army Corps of Engineers**

MAY 1996

Prepared by:
**Merritt Smith Consulting
Environmental Science and Communication
3675 Mt. Diablo Blvd. #120 Lafayette, CA 94549**

For

HARLAND BARTHOLOMEW & ASSOCIATES, INC

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1.0 INTRODUCTION

The purpose of this technical report is to identify evaluation criteria and criteria of significance for the evaluation of potential surface water quality impacts. The Evaluation Criteria section describes the evaluation criteria (parameters that will be evaluated) and criteria of significance (numeric threshold of significance), and the Evaluation of Project Relative to Criteria section describes the approach that will be used to evaluate the project relative to each evaluation criterion.

2.0 EVALUATION CRITERIA

Potential surface water quality impacts of the project will be evaluated according to specific criteria to identify significant impacts. The evaluation criteria are numerous and are organized into those that relate to the following:

1. Exceedance or non-attainment of numeric water quality objectives, criteria, standards, Basin Plan or other policies?
2. Exceedance or non-attainment of narrative water quality objectives, criteria, standards, Basin Plan or other policies?
3. Any alteration of water quality in an Area of Special Biological Significance or National Marine Sanctuary?
4. Exceedance or non-attainment of numeric sediment quality criteria?

Each of these criteria are developed below.

2.1 NUMERIC WATER QUALITY OBJECTIVES

EPA and the Regional Boards have established numeric water quality standards, guidelines, objectives and policies to protect aquatic life. Typically, the water quality objectives for the protection of aquatic life were developed by EPA to protect the environment against toxicity and bioaccumulation. Applicable numeric water quality objectives for the protection of aquatic life are described in Table 1. Additional water quality objectives (conductivity, total dissolved solids, and dissolved oxygen) are given in Tables 2 and 3. The concentrations in reclaimed water of substances listed in Table 1 are described in the *Reclaimed Water Quality* Technical Report (MSC 1996). A potential water quality impact will be considered significant if the project causes the numeric value to be exceeded. In addition, if the receiving water exceeds the numeric criterion prior to project implementation and the project would increase the magnitude of the exceedance, a potential water quality impact will be considered significant. If more than one criterion for the protection of aquatic life exists for a particular substance, the criterion that is most protective of the environment (in most cases the lowest criterion) will be used to assess impacts. Potential human health impacts of water quality are addressed in Section 4.7 of the EIR/S. Table 5 provides an explanation of the types of water quality objectives that are given in Table 1, and identifies to which waters in the project area each apply.

Table 1.

Numeric Water Quality Objectives for the Protection of Aquatic Life
(see Table 4 for notes explaining values in this Table)

Constituent	Units	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Avg.	SF BAY RWQCB Salt Water 4 day Avg.	No. Coast RWQCB
Aluminum	mg/L	0.087				
Antimony	mg/L	1.6				
Dissolved Arsenic (all valence states)	mg/L	0.19	0.036	0.19	0.036	
Arsenic (pent)	mg/L	0.048	0.013			
Arsenic (tri)	mg/L	0.19	0.036			
Beryllium	mg/L	0.0053				
Dissolved Cadmium	mg/L	0.0012	0.0093	0.00130	0.0093	
Dissolved Chromium III	mg/L	0.205				
Dissolved Chromium (VI)	mg/L	0.01	0.05	0.011	0.05	
Dissolved Copper	mg/L	0.013	0.0024	0.0137	0.0049	
Iron	mg/L	1				
Dissolved Lead	mg/L	0.003	0.0081	0.00397	0.0056	
Mercury	mg/L	0.0013	0.0011	0.0024	0.0021	
Dissolved Nickel	mg/L	0.182	0.0082	0.183	0.0083	
Selenium	mg/L	0.005	0.071	0.005	0.071	
Dissolved Silver	mg/L	0.0019	0.0019	0.054	0.0023	
Thallium	mg/L	0.04	2.13			
Dissolved Zinc	mg/L	0.121	0.081	0.123	0.086	
1,1,2,2-Tetrachloroethane	µg/L	2400	9020			
1,1,1-Trichloroethane	µg/L		31,200			
1,1,2-Trichloroethane	µg/L	9400				
1,2-Dichloroethane	µg/L	20,000	113,000			
1,2-Diphenylhydrazine	µg/L	270				
2,3,5,6-Tetrachlorophenol	µg/L		440			
2,4,6-Trichlorophenol	µg/L	970				
2,4-Dichlorophenol	µg/L	365				

Table 1.

Numeric Water Quality Objectives for the Protection of Aquatic Life
(see Table 4 for notes explaining values in this Table)

Constituent	Units	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Avg.	SF BAY RWQCB Salt Water 4 day Avg.	No. Coast RWQCB
2,4-Dimethylphenol	µg/L	2120				
2-Chlorophenol	µg/L	2000				
Acenaphthene	µg/L	520	710			
Acrolein	µg/L	21	55			
Acrylonitrile	µg/L	2600				
Aldrin	µg/L	3.0	1.3			
Benzene	µg/L	5300	700			
Benzidine	µg/L	2500				
BHC-gamma	µg/L	0.08	0.16	0.08	0.16	
Carbon Tetrachloride	µg/L	35,200	50,000			
Chlordane	µg/L	0.0043	0.004	0.0043	0.004	
Chlorinated Benzenes	µg/L	50	129			
Chlorinated Naphthalenes	µg/L	1600	7.5			
Chloroalkyl Ethers	µg/L	238,000				
Chloroform	µg/L	1240				
Chlorophenol 4	µg/L		29,700			
Chlorpyrifos	µg/L	0.041	0.0056			
Chloro-4methyl-3phenol	µg/L	30				
DDE	µg/L	1050	14			
TDE (DDT metabolite)	µg/L	0.06	3.6			
DDT-4,4'	µg/L	0.001	0.001			
DDTs	µg/L	0.001	0.001	0.001	0.001	
Demeton	µg/L	0.1	0.1			
Dichlorobenzenes	µg/L	763	1970			
Dichloroethylenes	µg/L	11,600	224,000			
Dichloropropane	µg/L	5700	3040			
Dichloropropene	µg/L	244	790			
Dieldrin	µg/L	0.0019	0.0019	0.0019	0.0019	
Dinitrotoluene	µg/L	230	370			

Table 1.

Numeric Water Quality Objectives for the Protection of Aquatic Life
(see Table 4 for notes explaining values in this Table)

Constituent	Units	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Avg.	SF BAY RWQCB Salt Water 4 day Avg.	No. Coast RWQCB
Endosulfan	µg/L	0.056	0.0087	0.056	0.0087	
Endosulfan-alpha	µg/L	0.056	0.0087			
Endosulfan-beta	µg/L	0.056	0.0087			
Endrin	µg/L	0.0023	0.0023	0.0023	0.0023	
Ethylbenzene	µg/L	32,000	430			
Fluoranthene	µg/L	3980	16			
Guthion	µg/L	0.01	0.01			
Haloethers	µg/L	122				
Halomethanes	µg/L	11,000	6400			
Heptachlor	µg/L	0.0038	0.0036	0.0038	0.0036	
Heptachlor Epoxide	µg/L	0.0038	0.0036			
Hexachlorobutadiene	µg/L	9.3	32			
Hexachlorocyclopentadiene	µg/L	5.2	7			
Hexachloroethane	µg/L	540	940			
Isophorone	µg/L	117,000	12,900			
Malathion	µg/L	0.1	0.1			
Methoxychlor	µg/L	0.03	0.03			
Mirex	µg/L	0.001	0.001			
Naphthalene	µg/L	620	2350			
Nitrobenzene	µg/L	27,000	6,680			
Nitrophenols	µg/L	150	4850			
Nitrosamines	µg/L	5850	3,300,000			
PAHs	µg/L		300			
Parathion	µg/L	0.013				
PCB-1016	µg/L	0.014	0.03			
PCB-1221	µg/L	0.014	0.03			
PCB-1232	µg/L	0.014	0.03			
PCB-1242	µg/L	0.014	0.03			
PCB-1248	µg/L	0.014	0.03			

Table 1.

Numeric Water Quality Objectives for the Protection of Aquatic Life
(see Table 4 for notes explaining values in this Table)

Constituent	Units	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Avg.	SF BAY RWQCB Salt Water 4 day Avg.	No. Coast RWQCB
PCB-1254	µg/L	0.014	0.03			
PCB-1260	µg/L	0.014	0.03			
PCBs	µg/L	0.014	0.03	0.014	0.03	
Pentachlorinated Ethanes	µg/L	1100	281			
Pentachlorophenol	µg/L	13	7.9	13	7.9	
Phenol	µg/L	2560	5800			
Phthalate Esters	µg/L	3	3.4			
Tetrachloroethanes	µg/L	9320				
Tetrachloroethylene	µg/L	840	450			
Toluene	µg/L	17,500	5000			
Toxaphene	µg/L	<0.039	0.21	0.0002	0.00002	
Tributyltin	µg/L			0.02		
Trichloronated Ethanes	µg/L	18,000				
Trichloroethylene	µg/L	21,900	2000			
Alkalinity	µg/L	20,000				
Ammonia (Un-ionized)- Sensitive Species Absent	mg-N/L	0.0153	0.035			
Ammonia (Un-ionized)- Sensitive Species Present	mg-N/L	0.0153	0.035	0.025, 0.16	0.025, 0.16, 0.4	
Chloride	mg/L	230				
Chlorine	µg/L	11	7.5			
Conductivity	µmhos/ cm					see Table 2
Cyanide	µg/L	5.2	1		1.0	
Dissolved Oxygen	mg/L	See Table 3	See Table 3	5.0, 7.0	5.0, 7.0	See Table 2
pH		6.5-9	6.5-8.5	6.5-8.5		6.5-8.5
Phosphorus Elemental	µg/L		0.1			
Sulfide-Hydrogen Sulfide	µg/L	2	2	0	0	
Total Dissolved Solids	mg/L					See Table 2

Table 1.

Numeric Water Quality Objectives for the Protection of Aquatic Life
(see Table 4 for notes explaining values in this Table)

Constituent	Units	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Avg.	SF BAY RWQCB Salt Water 4 day Avg.	No. Coast RWQCB
Toxicity	TUc			1.0	1.0	

Sources: National Toxics Rule, 40 CFR Part 131. (Enforceable Criteria)

North Coast Regional Water Quality Control Board 1994. Water Quality Control Plan for the North Coast Region

San Francisco Regional Water Quality Control Board 1991. Water Quality Control Plan. San Francisco Region. (SF BAY RWQCB fresh and salt water 4 day averages)

EPA 1986. Quality Criteria for Water 1986 (Update # 2). EPA 440/5-86-001. (Guidelines)

Table 2.

Water Quality Objectives (Conductivity, Total Dissolved Solids, and Dissolved Oxygen) for the
North Coast Region

	Conductivity ($\mu\text{mhos}/\text{cm}^2$) at 77 °F		Total Dissolved Solids (mg/L)		Dissolved Oxygen (mg/L)		
	90% Upper Limit ^a	50% Upper Limit ^b	90% Upper Limit ^a	50% Upper Limit ^b	Min.	90% Lower Limit ^a	50% Lower Limit ^b
Russian River upstream of the Laguna	320	250	170	150	7.0	7.5	10.0
Russian River downstream of the Laguna	375	285	200	170	7.0	7.5	10.0
Laguna de Santa Rosa					7.0	7.5	10.0
Other waters designated warm, marine, or saline					5.0		
Other waters designated cold					6.0		
Other waters designated spawning					7.0		
Other waters designated spawning during critical periods ^c					9.0		

Source: North Coast Regional Water Quality Control Board. 1994. Water
Quality Control Plan for the North Coast Region.

- ^a 90% upper and lower limits represent the 90th percentile values for a calendar year. 90 percent or more of the values must be less than or equal to an upper limit and greater than or equal to a lower limit for the water to be in attainment.
- ^b 50% upper and lower limits represent the 50th percentile values of the monthly means for a calendar year. 50 percent or more of the monthly means must be less than or equal to an upper limit and greater than or equal to a lower limit for the water to be in attainment. The 50th percentile upper limit point of significance for conductivity is more stringent than the 90th percentile upper limit point of significance. Therefore, compliance with the 50th percentile upper limit point of significance was evaluated.
- ^c Critical periods are during spawning and egg incubation.

Table 3.

EPA Water Quality Criteria for Ambient Dissolved Oxygen Concentration (mg/L)

	Coldwater Criteria		Warmwater Criteria	
	Early life stages ^{a,b}	Other life stages	Early life stages ^b	Other life stages
30 day mean	NA ^c	6.5	NA	5.5
7 day mean	9.5 (6.5)	NA	6.0	NA
7 day mean minimum	NA	5.0	NA	4.0
1 day minimum ^{d,e}	8.0 (5.0)	4.0	5.0	3.0

EPA 1986. Quality Criteria for Water 1986. EPA 440/5-86-001.

-
- ^a These are water column concentrations recommended to achieve the required intergravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column, the figures in parentheses apply.
- ^b Includes all embryonic and larval stages and all juvenile forms to 30-days following hatching.
- ^c NA = not applicable.
- ^d For highly manipulatable discharges, further restrictions apply.
- ^e All minima should be considered as instantaneous concentrations to be achieved at all times.

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Aluminum		Guideline. For waters with pH between 6.5 and 9.0.				
Antimony		Guideline				
Dissolved Arsenic		Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).			
Arsenic (pent)		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Arsenic (tri)		Guideline	Guideline			
Beryllium		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Dissolved Cadmium		Enforceable. Hardness dependent criterion defined as $(e^{(0.7852 \times (\text{LN}(\text{hardness}))-3.49)}) \times (1.101672 - (\text{LN}(\text{hardness})) \times 0.041838)$. Assumes hardness = 119 mg/L. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Hardness dependent criterion defined as $(e^{(0.7852 \times (\text{LN}(\text{hardness}))-3.49)})$. Assumes hardness = 119 mg/L.		
Dissolved Chromium (III)		Enforceable. Hardness dependent Criterion defined as $(e^{(0.819 \times (\text{LN}(\text{hardness}))+1.561)}) \times 0.86$. Assumes hardness = 119 mg/L. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).				
Dissolved Chromium (VI)		Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	This objective may be met as total chromium.	This objective may be met as total chromium.	

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Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Dissolved Copper		Enforceable. Hardness dependent Criterion defined as $(e^{(0.8545 \times (\text{LN}(\text{hardness}))-1.465)}) \times 0.96$. Assumes hardness = 119 mg/L. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Hardness dependent Criterion defined as $(e^{(0.8545 \times (\text{LN}(\text{hardness}))-1.465)})$. Assumes hardness = 119 mg/L.	Criterion is 1-hour average. No 4-day average is available	
Iron		Guideline				
Dissolved Lead		Enforceable. Hardness dependent Criterion defined as $e^{(1.273 \times (\text{LN}(\text{hardness}))-4.705)} \times (1.46203 - (\text{LN}(\text{hardness}) \times 0.145712))$. Assumes hardness = 119 mg/L. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).m	Hardness dependent Criterion defined as $e^{(1.273 \times (\text{LN}(\text{hardness}))-4.705)}$. Assumes hardness = 119 mg/L.		
Mercury	EPA criteria based on FDA action levels for the protection of human health	Value shown is the Final Chronic Value	Value shown is the Final Chronic Value	Criterion is 1-hour average. No 4-day average is available	Criterion is 1-hour average. No 4-day average is available	

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Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Dissolved Nickel		Enforceable. Hardness dependent criterion defined as $e^{(1.273 \times (\text{LN}(\text{hardness}))-4.705)} \times 0.997$. Assumes hardness = 119 mg/L. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).m	Hardness dependent Criterion defined as $e^{(1.273 \times (\text{LN}(\text{hardness}))-4.705)}$. Assumes hardness = 119 mg/L.		
Selenium		Enforceable. Expressed as total recoverable.	Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).			
Dissolved Silver		Enforceable. Criterion shown is the CMC. No CCC available	Enforceable. Criterion shown is the CMC. No CCC available	Criterion is an instantaneous maximum. No 4-day average is available. Hardness dependent Criterion defined as $e^{1.72(\text{LN}(\text{Hardness})) - 6.52}$	Criterion is 1-hour average. No 4-day average is available	

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Thallium		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Dissolved Zinc		Enforceable. Hardness dependent Criterion defined as $(e^{(0.8473 \times (\ln(\text{hardness})) + 0.7614}) \times 0.986$. Assumes hardness = 119 mg/L. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Enforceable. Criterion is expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).	Hardness dependent Criterion defined as $(e^{(0.8473 \times (\ln(\text{hardness})) + 0.7614})$. Assumes hardness = 119 mg/L.		
1,1,2,2-Tetrachloroethane		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
1,1,1-Trichloroethane			Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

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Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
1,1,2- Trichloroethane		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
1,2- Dichloroethane		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
1,2- Diphenylhydrazine		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
2,3,5,6- Tetrachlorophenol			Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

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Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
2,4,6- Trichlorophenol		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
2,4- Dichlorophenol		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
2,4- Dimethylphenol		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
Acenaphthene		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Acrolein		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

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Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Acrylonitrile		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
Aldrin	EPA criteria based on FDA action levels for the protection of human health	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.			
Benzene		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Benzidine		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				

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Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
BHC Gamma		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Criterion shown is CMC. No CCC available. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Criterion is daily average. No 4-day average is available.	Criterion is daily average. No 4-day average is available.	
Carbon Tetrachloride		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

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Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Chlordane	sum of chlordane-alpha, chlordane- gamma, chlordene-alpha, chlordene- gamma, nonachlor-alpha, nonachlor- gamma, and oxychlordane unless otherwise noted. EPA criteria based on FDA action levels for the protection of human health	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.	Criterion is daily average. No 4-day average is available.	Criterion is daily average. No 4-day average is available.	
Chlorinated Benzenes		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Chlorinated Naphthalenes		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Chloroalkyl ethers		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
Chloroform		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
Chlorophenol 2		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Chlorophenol 4			Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Chlorpyrifos		Guideline.	Guideline.			
Chloro-4 methyl-3 phenol		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
DDE		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
TDE (DDT metabolite)		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

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Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
DDT-4,4'		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			
DDTs	The sum of the p,p' and o,p' isomers of DDT, DDD(TDE) and DDE unless otherwise specified.	Guideline. Not specified as total.	Guideline. Not specified as total.	Criterion is daily average. No 4-day average is available.	Criterion is daily average. No 4-day average is available.	
Demeton		Guideline.	Guideline.			
Dichlorobenzenes		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Dichloroethylenes		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Dichloropropane		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Dichloropropene		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Dieldrin	EPA criteria based on FDA action levels for the protection of human health	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.	Criterion is daily average. No 4-day average is available.	Criterion is daily average. No 4-day average is available.	

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Dinitrotoluene		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Endosulfan	sum of endosulfan-alpha, endosulfan-beta, and endosulfan sulfate			Criterion is daily average. No 4-day average is available.	Criterion is daily average. No 4-day average is available.	
Endosulfan-alpha		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			
Endosulfan-beta		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Endrin	Sum of endrin and endrin aldehyde unless otherwise specified. EPA criteria based on FDA action levels for the protection of human health	Enforceable. Not specified as total. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. . Not specified as total. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Criterion is daily average. No 4-day average is available.	Criterion is daily average. No 4-day average is available.	
Ethylbenzene		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Fluoranthene		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Guthion		Guideline	Guideline			

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Haloethers		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
Halomethanes	sum of bromoform, bromomethane (methyl bromide), chloromethane (methyl chloride), chlorodibromomethane, and dichlorobromomethane.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Heptachlor	EPA criteria based on FDA action levels for the protection of human health	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.	Criterion is daily average. No 4-day average is available.	Criterion is daily average. No 4-day average is available.	

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Hepthachlor Epoxide	EPA criteria based on FDA action levels for the protection of human health	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.	Value shown is FDA action levels for the protection of human health. Should not be considered further if there is no evidence in wastewater.			
Hexachloro-butadiene		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Hexachloro-cyclopentadiene		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Hexachloroethane		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

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Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Isophoron		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Malathion		Guideline	Guideline			
Methoxychlor		Guideline	Guideline			
Mirex		Guideline	Guideline			
Naphthalene		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Nitrobenzene		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Nitrophenols		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Nitrosamines		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
PAHs			Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Parathion		Guideline				
PCB-1016		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
PCB-1221		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			
PCB-1232		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			
PCB-1242		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			
PCB-1248		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			

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Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
PCB-1254		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			
PCB-1260		Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.	Enforceable. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development.			

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Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
PCBs	(polychlorinated biphenyls) shall mean the sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260.	Guideline	Guideline	Criterion is daily average. No 4-day average is available.	Criterion is daily average. No 4-day average is available.	
Pentachlorinated Ethanes		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Pentachlorophenol		Enforceable. pH dependent criteria defined as $e^{(1.005(\text{pH}) - 5.290)}$. Assumes pH = 7.8	Enforceable	Enforceable. pH dependent criteria defined as $e^{(1.005(\text{pH}) - 5.290)}$. Assumes pH = 7.8		
Phenol		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Phthalate Esters		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Tetrachloroethanes		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
Tetrachloroethylenes		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

Table 4.

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Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Toluene		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			
Toxaphene	EPA criteria based on FDA action levels for the protection of human health	The available data on freshwater acute-chronic ratios do not allow calculation of a freshwater Final Chronic Value, but if one could be calculated it would have to be less than the 0.039 µg/L that adversely affected brook trout.	Final Chronic Value			
Trichlorinated ethanes		Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.				
Trichloroethylene		Guideline. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.	Guideline. Criterion is CMC. No CCC available. Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level.			

Table 4.

Notes Explaining Values in Table 1

Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Alkalinity		Guideline				
Ammonia (Un-ionized) - Sensitive Species Absent	salmonids or other sensitive cold water species absent	Guideline. Criterion is pH and temperature dependent. Assumes pH = 7.5 and temperature = 15°.				
Ammonia (Un-ionized) - Sensitive Species Present	salmonids or other sensitive cold water species present	Guideline. Criterion is pH and temperature dependent. Assumes pH = 7.5 and temperature = 15°.		0.025 mg-N/L = annual median; 0.16 mg-N/L = maximum	0.025 mg-N/L = annual median; 0.16 mg-N/L = maximum for Central Bay and upstream; 0.4 mg-N/L = maximum for Lower Bay and South Bay	
Chlorine		Guideline	Guideline			
Cyanide		Enforceable	Enforceable		Criterion is daily average. No 4-day average is available.	

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Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Dissolved Oxygen				5.0 mg/L minimum for waters designated as warm water; 7.0 mg/L minimum for waters designated as cold water	5.0 mg/L minimum downstream of Carquinez Bridge; 7.0 minimum upstream of Carquinez Bridge	

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Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
pH						Values are minimum and maximum for Russian River upstream and downstream of the confluence with the Laguna and for the Laguna. For Bodega Bay, maximum is 8.5 and pH shall not be depressed below natural background levels.

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Constituent	Constituent Comments	US EPA Fresh Water Continuous	US EPA Salt Water Continuous	SF BAY RWQCB Fresh Water 4 day Average	SF BAY RWQCB Salt Water 4 day Average	No. Coast RWQCB
Phosphorus Elemental			Guideline			
Sulfide-Hydrogen Sulfide		Guideline	Guideline			

Table 5.

Explanation of Numeric Water Quality Objectives		
Type of Objective	Source and Explanation	Project Waters to Which Objective Applies
USEPA Freshwater Continuous	In 40 CFR Part 131 (National Toxics Rule), EPA has established the Criterion Continuous Concentration, which are criteria for protecting aquatic life from chronic exposure	Applies to all project area surface fresh waters, except those in the SF Bay Regional Board jurisdiction.
USEPA Freshwater Maximum	In 40 CFR Part 131 (National Toxics Rule), EPA has established the Criterion Maximum Concentration, which are criteria for protecting aquatic life from exposure to short-term peak concentrations	Applies to all project area surface fresh waters, except those in the SF Bay Regional Board jurisdiction.
SF Bay RWQCB Freshwater 4-day Maximum	Water Quality Objective established by SF Bay Regional Board to protect the long-term effects of the 4-day maximum concentration (from Bay Basin Plan, 9/16/92, Table III-2B)	Applies to project area surface fresh waters that are tributary to the Petaluma River or San Pablo Bay
SF Bay RWQCB Freshwater Daily Maximum	Water Quality Objective established by SF Bay Regional Board to protect the acute effects of the daily maximum concentration (from Bay Basin Plan, 9/16/92, Table III-2B)	Applies to project area surface fresh waters that are tributary to the Petaluma River or San Pablo Bay
SF Bay RWQCB Saltwater 4-day Maximum	Water Quality Objective established by SF Bay Regional Board to protect the long-term effects of the 4-day maximum concentration (from Bay Basin Plan, 9/16/92, Table III-2B)	Applies to the Petaluma River and San Pablo Bay where salinity is greater than 5 parts per thousand
SF Bay RWQCB Saltwater Daily Maximum	Water Quality Objective established by SF Bay Regional Board to protect the acute effects of the daily maximum concentration (from Bay Basin Plan, 9/16/92, Table III-2A)	Applies to the Petaluma River and San Pablo Bay where salinity is greater than 5 parts per thousand
SF Bay RWQCB Saltwater 1-hour Maximum	Water Quality Objective established by SF Bay Regional Board to protect the acute effects of the 1-hour maximum concentration (from Bay Basin Plan, 9/16/92, Table III-2A)	Applies to the Petaluma River and San Pablo Bay where salinity is greater than 5 parts per thousand
SF Bay RWQCB Saltwater Instant. Maximum	Water Quality Objective established by SF Bay Regional Board to protect the acute effects of the instantaneous maximum concentration (from Bay Basin Plan, 9/16/92, Table III-2A)	Applies to the Petaluma River and San Pablo Bay where salinity is greater than 5 parts per thousand
No. Coast RWQCB Cool Water Max	Water Quality Objective established by North Coast Regional Board for dissolved oxygen to protect cool water species (North Coast Basin Plan, 3/24/94, Table 3-1)	Applies to Russian River upstream of the Laguna
No. Coast RWQCB Cool Water Max	Water Quality Objective established by North Coast Regional Board for dissolved oxygen to protect warm water species (North Coast Basin Plan, 3/24/94, Table 3-1)	Applies to all project area surface waters in the North Coast Region except Russian River upstream of the Laguna

The following definitions of water quality criteria, objectives, and guidelines are used in this report:

- **Water quality criteria.** The standards set by EPA that will apply in states that have not developed water quality standards as mandated by Clean Water Act Section 303(c)(2)(B). The State of California is not in compliance with Section 303(c)(2)(B) because the Statewide water quality plans, which developed California water quality standards, were invalidated by a legal decision. The EPA water quality criteria were most recently promulgated in the National Toxics Rule (40 CFR Part 131). EPA is currently holding public hearings and intends to promulgate criteria for California that will apply until California complies with Section 303(c)(2)(B). This is further explained in EPA (1995) (attached). For purposes of the evaluation of the long-term project impacts, the EPA criteria are assumed to apply to California.
- **Water quality guidelines.** The criteria developed by the EPA to assist states in setting their own standards or objectives. These are not enforceable standards unless promulgated by the EPA. However, as a conservative measure, EPA guidelines will also be used in the evaluation of the long-term project impacts.
- **Water quality objectives.** The standards set by the State of California that are enforceable. Water quality objectives are described in Statewide and regional water quality plans, such as the Ocean Plan and regional basin plans. The State's Inland Surface Water Plan and the Enclosed Bays and Estuaries Plan are currently being re-developed after being invalidated by a county superior court. The State currently has a valid Ocean Plan. The San Francisco Bay Basin Plan and the North Coast Basin Plan specify water quality objectives which will be used in the in the evaluation of the long-term project impacts.

Several water quality criteria, guidelines or objectives (criteria) have been developed for each of several toxic substances, especially metals, to reflect the relationship of exposure duration and concentration to toxicity. For example, the criteria maximum concentration for arsenic established by EPA is 0.36 mg/L, whereas the criteria continuous concentration for arsenic is 0.19 mg/L. The instantaneous maximum criterion is greater than the continuous criterion because organisms can tolerate elevated concentrations for short durations. Evaluation of project impacts with respect to both the maximum criterion and the continuous criterion is appropriate for typical discharges where the quality of effluent is variable. The quality of reclaimed water that is effluent from the Laguna treatment plant appears to vary in a manner similar to typical effluents. However, since the effluent is stored in ponds prior to discharge, the variation is low, and will be in the future, dampened substantially. Therefore, Table 1 includes the continuous criterion for constituents for which one has been established. The maximum concentration criterion is also shown in Table 1 for constituents for which a continuous criterion has not been established.

The use of the continuous criterion does not preclude the evaluation of peak concentrations in the receiving water that may result from peak discharge of reclaimed water. Peak constituent concentrations will be evaluated against the continuous criterion, which is lower than the maximum concentration. Another reason to use the continuous rather than the maximum criterion is that discharge operations and simulations (as described in the *Russian River Water Quality Model* and *Estero Water Quality Model* Technical Reports, RMA 1996) use a daily time step, a time step that is too long for application of the maximum Criterion as defined by the EPA (one hour).

The EPA criteria for mercury and dioxin are based on FDA action levels for human consumption of fish. Therefore, the EPA criteria for these substances are not designed to be protective of aquatic organisms. The EPA (1984) states there are not enough data to develop a criterion for dioxin based on the protection of aquatic life. Since no criterion for dioxin for the protection of aquatic life exists, dioxin was removed from consideration of significant water quality impacts (for human health impacts, see the Public Health and Safety section of the EIR/S). Although the criterion for mercury promulgated by the EPA is based on FDA action levels for human consumption of fish, Final Chronic Values which are designed to be protective of aquatic organisms exist for mercury (EPA 1985). These Final Chronic Values are used for the freshwater and saltwater Evaluation Criteria for mercury rather than the criteria which are protective of humans. Health risks for humans from mercury are addressed in the Public Health and Safety section of the EIR/S.

Some of the metals criteria identified in Table 1 are dependent on the hardness of the ambient water. Since increasing hardness decreases toxicity, the criteria for these particular metals increases as a function of hardness according to the formula developed by EPA for each metal. The values shown in Table 1 are calculated using the long-term average Russian River hardness of 118 mg/L (as CaCO_3) and are included for illustration purposes only. Hardness-dependent criteria will be calculated using the hardness for particular waters.

Metals can exist in the aquatic environment in several forms as follows:

1. Dissolved free ionic
2. Dissolved chelated
3. Solid-adsorbed
4. Precipitated

The sum of the quantity of metals in all four of these states is typically called the "total" concentration of metal, and the sum of metals in states 1 and 2 is typically called "dissolved." At the time that EPA promulgated the National Toxics Rule (December 1992), the Agency's policy was to express metals criteria using total recoverable metal concentrations. Subsequently, EPA determined that dissolved metals (free and chelated) better approximate the biologically available fraction of waterborne metals for aquatic organisms than total recoverable metals. The EPA has developed an interim final rule (effective April 15, 1995) which promulgates the aquatic life metals as dissolved, in states that are subject to the National Toxics Rule. The interim final rule will be in effect while

EPA considers public comments and develops a final rule. The interim rule applies to all metals except selenium and the criterion maximum concentration for mercury. These metals are of concern due to bioaccumulation and therefore the criteria remain as total recoverable. The metals objectives in the San Francisco Bay Basin Plan have not been revised and so are based on total recoverable metals.

2.2 NARRATIVE WATER QUALITY OBJECTIVES

Narrative objectives and policies are summarized, and specific Evaluation Criteria that relate to each are included in Table 6. The narrative objectives have been established to protect beneficial uses and thus apply to receiving waters, not effluent. Beneficial potential impacts of discharge on Biostimulatory Substances, Turbidity and Waste Reduction Strategy are also identified.

Table 6.

Summary of Narrative Water Quality Objectives and Evaluation Criteria

Narrative Objective or Policy	Source	Evaluation Criterion (Impact Significant If:)	Rationale for Evaluation Criterion
Color. Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.	North Coast Basin Plan (3/24/94) page 3-2.00, Bay Basin Plan (9/16/92) page III-2	The discharge causes any change in apparent coloration lasting more than a day.	Narrative Objective
<p>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, or that cause nuisance or adversely affect beneficial uses.</p> <p>Numeric water quality objectives with regards to taste and odor thresholds have been developed by the State Department of Health Services and the U.S. State Department of Health Services and the U.S. EPA. 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.</p>	North Coast Basin Plan (3/24/94) page 3-2.00, Bay Basin Plan (9/16/92) page III-2	Addressed with drinking water standards evaluation in Public Safety, Section 4.7 of the EIR/S	Drinking water standards were established to protect human health and prevent non-health related effects such as taste and odor. These standards are addressed in the Public Safety Section of the EIR/S (Section 4.7).
Floating Material. Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations that cause nuisance or adversely affect beneficial uses.	North Coast Basin Plan (3/24/94) page 3-2.00, Bay Basin Plan (9/16/92) page III-2	The discharge causes the accumulation of visible floating material, including solids, liquids, foams, film or coating, and scum.	Narrative Objective

Table 6.

Summary of Narrative Water Quality Objectives and Evaluation Criteria

Narrative Objective or Policy	Source	Evaluation Criterion (Impact Significant If:)	Rationale for Evaluation Criterion
Suspended Matter. Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.	North Coast Basin Plan (3/24/94) page 3-2.00, Bay Basin Plan (9/16/92) page III-2	Addressed with Sediment, Biostimulatory Substances, Turbidity criteria below	Suspended matter can derive from discharge of reclaimed water that contains suspended matter, from aquatic growth caused by nutrients in the discharge, and from project-related erosion. Direct discharge suspended matter in reclaimed water is addressed in the Turbidity and Settleable Matter criteria. Aquatic growth-related suspended matter is addressed in the Biostimulatory Substances criterion. Project-caused erosion is addressed in the Sediment criterion.
Settleable Matter. Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or adversely affect beneficial uses.	North Coast Basin Plan (3/24/94) page 3-2.00, Bay Basin Plan (9/16/92) page III-2	Plant effluent contains more than 0.1 mL/L as a 30-day average and 0.2 as a mL/L daily maximum	The values cited in the Evaluation Criterion are the effluent limits contained in a previous discharge permit and were found to be protective since no accumulation has been evident. The current discharge permit does not include an effluent limit for settleable matter.

Table 6.

Summary of Narrative Water Quality Objectives and Evaluation Criteria

Narrative Objective or Policy	Source	Evaluation Criterion (Impact Significant If:)	Rationale for Evaluation Criterion
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.	North Coast Basin Plan (3/24/94) page 3-3.00, Bay Basin Plan (9/16/92) page III-2	Addressed in Floating Material	Visible oil and grease effects would be included in the evaluation of Floating Material criterion attainment
Biostimulatory Substances. North Coast: 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. SF Bay: 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. Chlorophyll <i>a</i> concentration in excess of 50 µg/l (microgram per liter) upstream from Carquinez Bridge and 25 µg/l in San Pablo Bay and in Central and Lower San Francisco Bay will indicate a need for the investigation of the cause of those concentrations. Such investigations will not be necessary if the conditions are (1) of limited areal extent, (2) associated with the entrapment zone, or (3) not adversely affecting beneficial uses. Lowered concentrations of chlorophyll <i>a</i> may indicate a need for investigation depending on the affected receiving water and the beneficial uses thereof.	North Coast Basin Plan (3/24/94) page 3-3.00 Bay Basin Plan (9/16/92) page III-2	An impact is significant and adverse if the project causes more than a 10 percent increase in monthly average attached or planktonic chlorophyll <i>a</i> . An impact is significant and beneficial if the project causes more than a 10 percent decrease in monthly average attached or planktonic chlorophyll <i>a</i> due to non-toxic causes (i.e. flushing, decrease in nutrients, etc.).	Ten percent, established by professional judgment, is the criterion for identifying impacts on attached or planktonic algae. Ecological effects of algae are also addressed in the numeric dissolved oxygen evaluation criterion.

Table 6.

Summary of Narrative Water Quality Objectives and Evaluation Criteria

Narrative Objective or Policy	Source	Evaluation Criterion (Impact Significant If:)	Rationale for Evaluation Criterion
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.	North Coast Basin Plan (3/24/94) page 3-3.00, Bay Basin Plan (9/16/92) page III-2	Construction of pipelines in waterways results in an increase in suspended sediment in the waterways. Other causes of sediment discharge (upland construction and agriculture) are addressed in the Geology, Soils and Seismicity section (Section 4.2) and the Agriculture section (Section 4.3), respectively	The project could cause erosion three ways: construction in waterways (pipelines), construction in upland areas and through agricultural operations. Pipeline construction in waterways is addressed with this criterion. Dam construction is considered to be within a construction site and thus not within a waterway, and off-site transport of sediment is evaluated in the project as upland construction. Upland construction and agricultural operations are addressed in Sections 4.2 and 4.3, respectively. The project description (Section 2 of the EIR/EIS) assures that erosion from upland construction and agricultural operations will be either insignificant or reduced from current levels by the project. Therefore, upland construction and agriculture assumed to have no significant effect on sediment in waterways.

Table 6.

Summary of Narrative Water Quality Objectives and Evaluation Criteria

Narrative Objective or Policy	Source	Evaluation Criterion (Impact Significant If:)	Rationale for Evaluation Criterion
<p>Toxicity. 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 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 Water board.</p> <p>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 describe 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 objective for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.</p> <p>SF Bay Objectives are given in Table 1.</p>	<p>North Coast Basin Plan (3/24/94) page 3-4.00, Bay Basin Plan (9/16/92) page III-2</p>	<p>The discharge causes chronic toxicity following complete mixing of reclaimed water with receiving water. Lethality is the end point since it is the one of regulatory significance.</p>	<p>Narrative Objective</p> <p>TUc (chronic toxicity unit) is defined as 100/NOEL (No Observed Effect Level). The NOEL is the maximum percent test water that causes no observed effect on test organisms, as determined by critical life stage toxicity tests. For the purposes of evaluating impacts, the evaluation criterion shall be any increase in the frequency of toxicity.</p>

Table 6.

Summary of Narrative Water Quality Objectives and Evaluation Criteria

Narrative Objective or Policy	Source	Evaluation Criterion (Impact Significant If:)	Rationale for Evaluation Criterion
<p>Pesticides. 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 5), and listed in Table 4-2 of this Plan.</p>	<p>North Coast Basin Plan (3/24/94) page 3--4.00</p> <p>Note that Title 22 includes numeric standards that are addressed in Section 4.7 of this EIR/S</p>	<p>Any identifiable pesticide accumulation is described in the Aquatic Biology and Public Safety sections of the EIR/S and evaluated for significance in those sections. Pesticide accumulation is not addressed in the surface water quality section.</p>	<p>Risk assessments have been conducted to evaluate potential effects of project alternatives on humans and wildlife, and pesticides are addressed in Sections 4.7 and 4.10 of the EIR/S, respectively.</p>
<p>Salinity. Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the State so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.</p>	<p>Bay Basin Plan (9/16/92) page III-3</p>	<p>The discharge to San Pablo Bay or its tributaries causes an increase in salinity.</p>	<p>Applied to Bay waters to meet SF Regional Board objective.</p> <p>A Hydrology Evaluation Criterion was developed to avoid adverse project impacts on the Russian River Estuary.</p> <p>Project effects on flows into the Esteros is addressed below in the Water Quality Impacts on Special Sites section.</p>

Table 6.

Summary of Narrative Water Quality Objectives and Evaluation Criteria

Narrative Objective or Policy	Source	Evaluation Criterion (Impact Significant If:)	Rationale for Evaluation Criterion
<p>Temperature.</p> <p>Inland Surface Waters. The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. The temperature of any cold or warm freshwater habitat shall not be increased by more than 5 °F above the natural receiving water temperature.</p> <p>Estuaries. Elevated temperature waste discharges shall comply with the following:</p> <ul style="list-style-type: none"> a. The maximum temperature shall not exceed the natural receiving water temperature by more than 20 °F. b. Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than 1 °F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point. c. No discharge shall cause a surface water temperature rise greater than 4 °F above the natural temperature of the receiving waters at any time or place. 	<p>North Coast Basin Plan (3/24/94) page 3-3.00 Bay Basin Plan (9/16/92) page III-3</p> <p>Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan) (10/13/71) page SA-11</p>	<p>The project causes more than a 5 °F increase in monthly average temperature in freshwater.</p> <p>The project causes more than a 4 °F increase in monthly average temperature in estuaries.</p>	<p>Narrative Objective</p> <p>Evaluation for item B is not feasible for the potential discharges to estuaries in this project, therefore, the 4 °F criterion will be used.</p>

Table 6.

Summary of Narrative Water Quality Objectives and Evaluation Criteria

Narrative Objective or Policy	Source	Evaluation Criterion (Impact Significant If:)	Rationale for Evaluation Criterion
<p>Turbidity. Turbidity shall not be increased more than 20 percent above naturally occurring background levels. Allowable zones of dilution within which higher percentages can be tolerated may be defined for specific discharges upon the issuance of discharge permits or waiver thereof.</p>	<p>North Coast Basin Plan (3/24/94) page 3-3.00, Bay Basin Plan (9/16/92) page III-2</p>	<p>An impact is significant and adverse if monthly average turbidity increases more than 20 percent above estimated background levels as a result of the discharge . An impact is significant and beneficial if monthly average turbidity decreases more than 20 percent below estimated background levels as a result of the discharge.</p>	<p>Narrative Objective The narrative objective is intended to protect visual-related beneficial uses (i.e., aesthetics and fish feeding) from the effects of a reclaimed water discharge. Other project components that could affect turbidity are addressed as described in the Sediment criterion Rationale. An evaluation criterion of 20 percent was established by professional judgment to protect visual-related beneficial uses.</p>

Table 6.

Summary of Narrative Water Quality Objectives and Evaluation Criteria

Narrative Objective or Policy	Source	Evaluation Criterion (Impact Significant If:)	Rationale for Evaluation Criterion
<p>Waste Reduction Strategy. Pursuant to Section 303(d) of the federal Clean Water Act, the Regional Board has established long-term ammonia and total nitrogen reduction goals so that ammonia and dissolved oxygen objectives will be attained in the Laguna de Santa Rosa. Some of this reduction is allocated to the Subregional System's discharge, and the remainder is allocated to other sources. A nitrogen load reduction of 159,000 pounds per year and an ammonia load reduction of 21,500 pounds per year are needed to meet the Regional Board's long-term load reduction allocation for the Subregional System.</p>	<p>Waste Reduction Strategy for Laguna de Santa Rosa, NCRWQCB, March 1, 1995</p>	<p>An impact is significant and adverse if the load of total nitrogen from the Subregional system to the Laguna is not reduced by at least 159,000 pounds per year below the RWQCB 1995 estimated annual load of 1,177,722 pounds (value cited in Table D-5 of NCRWQCB (1995)).</p> <p>An impact is considered significant and beneficial if the load of total nitrogen is reduced by 159,000 pounds or more. An impact is significant and adverse if the load of total ammonia from the Subregional system to the Laguna is not reduced by at least 21,500 pounds per year.</p> <p>An impact is considered significant and beneficial if the load of total ammonia is reduced by 21,500 pounds or more.</p>	<p>The Subregional System needs to meet the Regional Board's long-term goal load reduction goal for total nitrogen and ammonia in the case of continued Laguna discharge. This could be met by controlling any of the nitrogen sources in the Laguna. Impacts of total nitrogen and ammonia on the Russian River are addressed with the Evaluation Criteria that are based on the Biostimulatory Substances narrative objective and numeric water quality criterion for ammonia.</p>

Beneficial uses for waters in the project area are defined in Section 2 of the North Coast Basin Plan as follows:

Municipal and Domestic Supply (MUN) - Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Agricultural Supply (AGR) - Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering or support of vegetation for range grazing.

Industrial Service Supply (IND) - Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurizations.

Industrial Process Supply (PROC) - Uses of water for industrial activities that depend primarily on water quality.

Groundwater Recharge (GWR) - Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality or halting of saltwater intrusion into freshwater aquifers.

Freshwater Replenishment (FRSH) - Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g. salinity).

Navigation (NAV) - Uses of water for shipping, travel, or other transportation by private, military or commercial vessels.

Water Contact Recreation (REC-1) - Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white-water activities, fishing or use of natural hot springs.

Non-Contact Water Recreation (REC-2) - Uses of water for recreational activities involving proximity to water but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Commercial and Sport Fishing (COMM) - Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to uses involving organisms intended for human consumption or bait purposes.

Aquaculture (AQUA) - Uses of water for aquaculture or mariculture operations, including but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Warm Freshwater Habitat (WARM) - Uses of water that support warm water ecosystems including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Cold Freshwater Habitat (COLD) - Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation fish, or wildlife, including invertebrates.

Estuarine Habitat (EST) - Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Marine Habitat (MAR) - Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Wildlife Habitat (WILD) - Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Preservation of Areas of Special Biological Significance (BIOL) - Includes marine life refuges, ecological reserves and designated areas of special biological significance, such as areas where kelp propagation and maintenance are features of the marine environment requiring special protection.

Rare, Threatened, or Endangered Species (RARE) - Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

Migration of Aquatic Organisms (MIGR) - Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction, and/or Early Development (SPWN) - Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Shellfish Harvesting (SHELL) - Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sports purposes.

The San Francisco Bay Basin Plan identifies the same beneficial uses as those cited above from the North Coast Basin Plan, except that the Bay Board does not identify Inland Saline Water Habitat, Aquaculture, or Hydropower Generation. Table 7 summarizes the beneficial uses that have been designated by both Regional Boards for waters in the project area.

2.3 WATER QUALITY IMPACTS ON SPECIAL SITES

The regulations and the Management Plan of the Gulf of the Farallones National Marine Sanctuary (15 CFR 936) indicate that the Sanctuary was created to protect an unusual site. The policy of the Bay Regional Board regarding the State-designated Area of Special Biological Significance at Tomales Point is that no project shall affect water quality in the Area. Therefore, any water quality change in the Area of Special Biological Significance or in the Sanctuary will be considered significant.

Table 7.

Beneficial Uses of Waters in the Project Area

X=Bay Regional Board's designation (see Bay Basin Plan). E=North Coast Board's designation of existing beneficial use. P= North Coast Board's designation of potential beneficial use (see North Coast Basin Plan). Abbreviations for beneficial uses are defined in text.

	Mun	Agr	Ind	Proc	Gwr	Frsh	Nav	Rec1	Rec2	Comm	Aqua	Warm	Cold	Biol	Wild	Rare	Mar	Migr	Spwn	Shell	Est
Petaluma R.						X	X	X		X		X		X	X	X	X	X			
San Pablo Bay			X				X	X	X	X					X	X		X	X	X	X
Russian R.	E	E	E	E	E		E	E	E	E	E	E	E		E	E			E		
Laguna		E	E					E	E	E	P		E		E						
Bodega Bay		E	E				E	E	E	E	E		E	E	E		E	E	E	E	
Estuaries			P	P			E	E	E	P				P	E	P	E	E	E	E	E
Coastal Streams	E	P	P		P			P	P	E	P		P		P			P	P		E
Coastal Waters			E		E		E	E	E	E	E			P	E	E	E	E	E	E	
Ocean			P	P			E	E	E	E	E			P	E	E	E	E	E	E	

2.4 SEDIMENT CRITERIA

The EPA is authorized to develop and implement sediment quality criteria (SQC) under Section 304(a) of the Clean Water Act and has established SQC for five nonionic organic chemicals (Table 8). The specific regulatory uses of SQC have not been established (DiToro, et al. 1991, EPA 1993).

As defined by DiToro, et al. (1991), and the EPA (1993), the term sediment quality criteria refers to numerical concentrations for individual chemicals that are applicable across the range of sediments encountered in practice. SQC are intended to be predictive of biological effects and so can be used as the concentration of a chemical that is protective of benthic aquatic life.

The SQC for each organic compound is based on the partitioning coefficient between pore water and sediment carbon. The SQC for nonionic organic chemicals are based on the chemical concentration in sediment organic carbon, i.e. they are normalized to sediment organic carbon. Therefore, field measurements of organic compounds in sediments to be compared to the SQC are first normalized to sediment organic carbon. The use of organic carbon normalization is equivalent to using pore water normalization as a means of accounting for varying bioavailability.

Contaminants in sediments tend to be associated with particle surfaces. Therefore, differences in contaminant concentrations among sites can be generated simply by differences in particle sizes of sediments. For naturally contaminated sediments, particle size effects are removed if organic carbon-normalized concentrations are compared (DiToro, et al. 1991, EPA 1993).

Table 8.

EPA Sediment Quality Criteria (SQC)
(µg/g organic carbon)

Constituent	Freshwater SQC	Marine SQC
Acenaphthene	130	230
Dieldrin	11	20
Endrin	4.2	0.76
Fluoranthene	620	300
Phenanthrene	180	240

3.0 EVALUATION OF PROJECT RELATIVE TO CRITERIA

The approach that will be use to evaluate the project to determine impact significance using the Evaluation Criteria is described in this section for the numeric-based, narrative-based and special site criteria. Each Evaluation Criterion is shown in italic-faced type.

3.1 NUMERIC-BASED EVALUATION CRITERIA

Evaluation Criterion: The impact will be considered significant if *the project causes the numeric value to be exceeded*.

Information about background water quality, quality of project-related inflows (direct discharge, irrigation subflow, and storage reservoir “seepage”), and the flow of each stream will be used to estimate the project impact on water quality. Estimated water quality will be compared directly to the numeric-based evaluation criteria to determine the significance of an impact. If the project would cause a numeric-based criterion to be exceeded, then the impact would be considered significant. Project impacts on water quality that would not cause a numeric-based criterion to be exceeded may also have significant effects, and the purpose of the wildlife risk assessment (summarized in EIR/S Section 4.10) is to identify any such effects.

For the evaluation of numeric- and narrative-based evaluation criteria, future reclaimed water quality conditions will be estimated based on recent reclaimed water quality monitoring data. Recent effluent quality data will be used directly as the basis for impacts evaluations unless the current treatment plant upgrade is expected to result in a change in effluent quality. Effluent nitrogen is the only constituent that is expected to be affected by the upgrade.

Information about background sediment quality and the quality of project-related inflows will be used to estimate the project impact on sediment quality. Estimated sediment quality will be compared directly to the numeric-based evaluation criteria (SQCs) to determine the significance of an impact. If the project would cause a SQC to be exceeded, then the impact would be considered significant. Project impacts on sediment quality that would not cause a SQC to be exceeded may also have significant effects, and the purpose of the wildlife risk assessment is to identify any such effects.

3.2 NARRATIVE-BASED EVALUATION CRITERIA

Each of the narrative-based criteria identified in Table 6 are addressed below.

3.2.1 Biostimulatory Substances

Evaluation Criterion: An impact will be considered significant and adverse *if the project causes more than a 10 percent increase in monthly average attached or planktonic chlorophyll a*. An impact is significant and beneficial *if the project causes more than a 10 percent decrease in monthly average attached or planktonic chlorophyll a due to no-toxic causes (i.e. flushing, decrease in nutrients, etc.)*.

A water quality model will be used to estimate chlorophyll a impacts. A comparison will be made between estimated conditions with the project (for all components) and existing conditions.

3.2.2 Coloration

Evaluation Criterion: An impact will be considered significant *if the project causes change in apparent color lasting more than one day*.

The City's existing NPDES permit includes the requirement that visual observations for color be made as part of the receiving water monitoring program. Records of any apparent color from past operations will be used to evaluate the potential for future impacts. If incidents of apparent color impact have been reported, then future impacts will be assumed to occur and will be assumed to be significant. If no incidents of apparent color impact have been reported, then no future impacts will be assumed to occur.

3.2.3 Floating Material

Evaluation Criterion: An impact will be considered significant *if the project causes accumulation of visible floating material, including solids, liquids, foams, and scum*.

As with the evaluation for color impacts, recent discharge monitoring data will be used to evaluate for floating material. For other project components an evaluation will be made of the potential for floating material to be produced.

3.2.4 Salinity

Evaluation Criterion: The impact will be considered significant *if the discharge to San Pablo Bay or its tributaries causes an increase in salinity*.

The impact on salinity of San Pablo Bay and its tributaries will be evaluated using the estimated salinity of any project-related flows and receiving water salinity.

3.2.5 Sediment

Evaluation Criterion: The impact will be considered significant *if construction of pipelines in waterways results in an increase in suspended sediment in the waterways*.

Construction methods will be evaluated to determine the potential for disturbance and increased transport of sediments.

3.2.6 Settleable Matter

Evaluation Criterion: The impact will be considered significant if *treatment plant effluent contains settleable matter comprising more than 0.1 mL/L 30-day average and 0.2 mL/L daily maximum.*

Effluent quality data will be evaluated.

3.2.7 Temperature

Freshwater Evaluation Criterion: The impact will be considered significant if *the project causes more than a 5 °F increase in temperature in freshwater.*

Estuarine Evaluation Criterion: The impact will be considered significant if *the project causes more than a 4 °F increase in temperature in estuaries.*

The available temperature data of the discharge will be compared to the available temperature data of the receiving waters, using appropriate dilution modeling as necessary to determine spatial extent.

3.2.8 Toxicity

Evaluation Criterion: The impact will be considered significant if *the frequency that conditions which potentially cause lethal effects in the receiving water is greater for the project than under existing conditions.*

Chronic toxicity testing of reclaimed water follows the US EPA freshwater “three species” short term sensitive life stage toxicity tests (EPA 1991 a,b), which consist of the following elements:

- 96-hour algal growth test with the green alga *Selenastrum capricornutum*;
Three-brood (7-day) survival and reproduction test with the crustacean *Ceriodaphnia dubia*; and,
7-day survival and growth test with larval fathead minnows, *Pimephales promelas*.

The algal growth, crustacean reproduction, and fish growth tests measure sublethal toxicity; crustacean and fish survival measure lethal effects. Each test is performed on a series of five effluent concentrations: 100, 50, 25, 10, and 5 percent. A toxic effect is indicated when the test response of a given treatment is significantly less than a control (a parallel test without effluent).

Toxicity results are described in terms of the concentration of effluent in which “no effect” is observed, and the concentration in which the “lowest effect” is observed. For example, if in a test the 100 percent effluent sample had a toxic effect (was significantly less than control), but the other dilutions (50, 25, 10, and 5 percent) had no effect (no significant difference from control), the “lowest effect” level would be 100 percent, and the “no effect” level would be 50 percent (the actual threshold of toxic effect could be 75 percent--or even 99 percent--but since no dilutions between 100 percent and 50 percent were tested, it can only be concluded that the lowest no-effect level *tested* was 50 percent. The “no effect” concentration is also called the NOEC (no observed effect concentration). and the “lowest effect” concentration is also called the LOEC (lowest observed effect concentration).

The frequency that lethal effects occurs in reclaimed water will be determined by dividing the number of test in which lethal toxicity was observed by the total number of tests. The frequency that conditions which potentially cause lethal effects in the receiving water will be estimated for project and existing conditions by multiplying the frequency that lethal effects occurs in reclaimed water by the frequency that the lowest NOEC would occur in Santa Rosa Creek. The impact will be considered significant if the frequency that conditions which potentially cause lethal effects in the receiving water is greater for the project than under existing conditions.

The wildlife risk assessment approach will also be used to evaluate toxicity impacts of project components other than direct discharge (i.e. irrigation and storage). The wildlife risk assessment results will be presented in the Aquatic Biological Resources section (Section 4.10) of the EIR/S.

3.2.9 Turbidity

Evaluation Criterion: The impact will be considered significant if *turbidity increases more than 20 percent above measured background levels as a result of the project.*

Turbidity data from reclaimed water, the Laguna, and the Russian River will be used to estimate project impacts on turbidity for each project alternative.

The impact of discharge on Laguna flows, and thus the resulting impact of Laguna turbidity on the Russian will not be evaluated directly. Rather, the impact of reclaimed water discharges on algae (which creates turbidity) in the Laguna will be evaluated, as indicated in the Biostimulatory Substances section above. To the extent that reclaimed water adversely affects algae in the Laguna or River, this approach will yield a finding of significant impact. To the extent that algae grow in the Laguna due to causes other than reclaimed water discharges and create turbidity impacts in the River, this approach would not yield a finding of significant impact.

3.2.10 Waste Reduction Strategy

Evaluation Criterion: The impact will be considered significant and adverse *if discharge to the Laguna does not cause total nitrogen load to the Laguna to be reduced by at least 159,000 pounds per year below the RWQCB 1995 estimated annual load of 1,177,722 pounds.* An impact will be considered significant and adverse *if discharge to the Laguna does not cause ammonia nitrogen load to the Laguna to be reduced by at least 21,500 pounds per year.* An impact will be considered to be significant and beneficial *if discharge to the Laguna causes total nitrogen load to the Laguna to be reduced by 159,000 or more pounds per year.* An impact will be considered significant and beneficial *if discharge to the Laguna causes ammonia nitrogen load to be reduced by 21,500 or more pounds per year.* .

Effluent quality data and discharge volume information will be used to calculate both the loads of total nitrogen and total ammonia in the receiving water for evaluation according to these criteria.

3.3 SPECIAL SITE CRITERIA

Evaluation Criterion: The impact will be considered significant if any water quality change occurs in the Area of Special Biological Significance or in the Sanctuary.

Information about background water quality and the quality of project-related inflows (direct discharge, irrigation subflow, and storage reservoir “leakage”) will be used to estimate the project impact on water quality in the Sanctuary and Area of Special Biological Significance. Estimated water quality will be compared to existing water quality to determine the significance of an impact. If the project would cause a change in water quality, then the impact would be considered significant.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

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ESTABLISHING WATER QUALITY CRITERIA FOR PRIORITY TOXIC POLLUTANTS IN CALIFORNIA

August 1995

The U.S. EPA Regional Office in San Francisco is currently developing a rule to reinstate limits on toxic pollutants (known as water quality criteria under federal law and water quality objectives under state law) that apply to inland surface waters and enclosed bays and estuaries in California. As we develop this document, known as the California Toxics Rule, we want to inform you about the purpose of these water quality criteria and how they may affect you, as well as provide you with updates on our progress. In addition, we want to provide opportunities for the public to review and comment on our intentions and progress. This fact sheet describes the "hows, whys, and whens" of our work. We hope you find it helpful. We invite you to attend the first of a series of public meetings on the California Toxics Rule, to be held on August 24 in San Francisco (see back page). To receive future fact sheets, please return the form that is on the back page.

**Public Meeting set for August 24:
See announcement on back page.**

WHAT ARE WATER QUALITY STANDARDS?

Under the Federal Clean Water Act (CWA), States are required to adopt water quality standards for all waters of the United States (as defined in the CWA). Water quality standards are comprised of designated uses and water quality criteria. Uses are designated for each water body within the State. Examples include aquatic life, fishing, drinking water, industrial water, etc. Most waters in California are designated to protect aquatic habitat, water contact recreation, and drinking water. Water bodies can tolerate different levels of chemicals depending upon the use of the water body. Criteria are specific limits for individual pollutants, depending upon the designated use, which should not be exceeded in rivers, streams, lakes, bays and estuaries. Protection of public health and the environment requires adoption of fairly stringent criteria.

Water quality standards are used to set permit limits for discharges of pollutants from point sources (such as industrial and municipal wastewater outfalls) under State and Federal permits. Other uses include setting goals for Superfund cleanups and implementing Best Management Practices to reduce nonpoint sources of pollution such as urban and farm runoff. These standards protect our nation's invaluable sources of water for drinking and for recreation.

WHY IS EPA PROMULGATING STANDARDS FOR CALIFORNIA?

Generally, the CWA gives states the responsibility for developing water quality standards. U.S. EPA provides technical assistance and reviews and acts to approve or disapprove standards. However, U.S. EPA can promulgate standards when it has disapproved a state's standards or otherwise deemed them inadequate. California has been without a comprehensive set of standards for priority toxic pollutants since September of 1994 due to a State court decision that invalidated the State's standards adopted in 1991.

Prior to 1987, states had great flexibility in what provisions they included in their standards. However, in 1987, Congress amended the CWA to require states to adopt numeric water quality criteria for toxic pollutants. These amendments signalled Congress' clear desire to have all states adopt a minimally protective set of standards for toxic pollutants. Specifically, section 303(c)(2)(B) of the CWA requires criteria for priority toxic pollutants in state water quality standards. States were to have adopted these criteria by February of 1990. This list of priority toxic pollutants currently consists of over 100 chemicals from categories such as: chlorinated organics; DDT and its metabolites; PCBs; heavy metals; pesticides; and others.

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To comply with the 1987 CWA amendments, in April of 1991, the State Water Resources Control Board (SWRCB) adopted two relevant water quality control plans: The Inland Surface Water Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP). These two statewide plans contained narrative and numeric water quality criteria for toxic pollutants. However, the State's plans omitted some priority pollutants and some water bodies within the State. The State of California was not in complete compliance with section 303(c)(2)(B) of the Clean Water Act. In November of 1991, EPA disapproved certain portions of the plans, and deferred action on another portion.

California was not alone; other states had not completely complied with Congress' requirement to adopt numeric criteria for priority toxic pollutants. In December of 1992, EPA promulgated a national rule (the National Toxics Rule (NTR)) for 14 states, including California. The NTR brought the last few states into compliance with section 303(c)(2)(B). Since California had adopted the ISWP and EBEP, and EPA had disapproved only a portion of them, the NTR applied to a limited number of water bodies and pollutants in California. The NTR was subsequently amended to reflect an updated U.S. EPA policy on metals that states that dissolved metal more closely approximates the bioavailable fraction of metal in the water column than does total recoverable metal.

Lawsuit Rescinds State Plans Establishing Toxics Criteria

Shortly after the SWRCB adopted the ISWP and EBEP in 1991, certain holders of discharge permits in California filed suit against the SWRCB for failing to comply with state law when adopting the water quality control plans. In March of 1994, a Superior Court for the County of Sacramento, California, found that the SWRCB had not complied with state law; the judgment ordered the SWRCB to rescind the plans. In September of 1994, the SWRCB formally rescinded the ISWP and EBEP. Since then, the State of California has been without numeric water quality criteria for most priority pollutants and is therefore out of compliance with section 303(c)(2)(B) of the Clean Water Act.

State Undertakes Readoption Process

In December of 1994, the SWRCB held a public meeting whereby it formally announced the start of its readoption of water quality control plans. This process, currently underway, includes facilitated work groups, each consisting of a representative from approximately eleven groups of stakeholders. Each work group will make

recommendations to the SWRCB on various topics of the plans. These topics include: chemical-specific criteria; toxicity objectives and implementation; economics; permitting and compliance; site-specific objectives; nonpoint source or watershed management; effluent-dominated water bodies; and agriculture. The work groups are meeting monthly for a six-month period, which will end in September. After recommendations are presented to the SWRCB, staff will continue the readoption process. The SWRCB expects to have a complete set of water quality standards in place by 1998. EPA fully supports and is participating in this process. This State process provides an excellent avenue for public participation on many topics.

EPA's California Toxics Rule

Simultaneously, U.S. EPA's Region 9 Office in San Francisco is preparing to promulgate criteria for priority toxic pollutants to bring the State of California into compliance as soon as possible with the CWA at section 303(c)(2)(b). These criteria will be in effect until the State's own rulemaking is complete. U.S. EPA's rule will restore priority toxic pollutant criteria for California's inland surface waters and enclosed bays and estuaries. The scope of this federal rule is narrow: numeric criteria and an authorizing compliance schedule provision which will apply to these federal criteria. When the SWRCB readopts its plans with U.S. EPA approval, U.S. EPA will rescind its rule.

WHAT IS OUR SCHEDULE?

U.S. EPA intends to publish the proposed rule and preamble in the Federal Register in early 1996. At that time, we will accept public comments for 45 days. These comments will then be reviewed and considered by U.S. EPA in preparing the final rule which is expected to be completed in the fall of 1996. Throughout this process U.S. EPA will hold public meetings and publish updated fact sheets to keep interested parties involved and informed. The schedule is:

- August 24, 1995: Initial U.S. EPA Public Meeting.
- Early 1996: Proposed Rule to be published in the Federal Register.
- 45 days subsequent to publishing: Public Comment Period; U.S. EPA will hold public meetings to solicit verbal and written comments during this period.
- 6 - 12 months: U.S. EPA to prepare responses to public comments and to prepare and publish the final rule in the Federal Register.