

APPENDIX B

ANALYTICAL CONSTITUENTS: DESCRIPTIONS, DATA SUMMARY, AND WATER QUALITY OBJECTIVES

This appendix contains a description of the constituents included in the Minimum Constituent List for Characterization, a summary of Caltrans runoff quality monitoring data compiled during 1997-99, and a summary of prevailing statewide water quality objectives.

Following is a brief description of the constituents listed in Table 4-1, Minimum Constituent List for Characterization. These constituents were selected based upon the rationale discussed in *Section 4*.

► CONVENTIONAL CONSTITUENTS

Electrical Conductivity (EC). Electrical conductivity is a measure of the ability of water to carry an electric current. This ability depends on the presence of ions, their concentration, valence, mobility, and temperature. Most dissolved inorganic substances in water are in the ionized form and thus contribute to the conductivity of the water. Many organic compounds, however, do not ionize, or ionize only partially, and hence do not contribute as much to the conductivity measurement. EC measurements can give an estimate of the variations in the dissolved mineral content of stormwater in relation to receiving waters.

Total Hardness as CaCO₃. Total hardness is a measure of the concentration of divalent cations in water. In most natural waters total hardness is the sum of the concentrations of Ca²⁺ and Mg²⁺ ions expressed as mg/l CaCO₃. The toxicity of certain metals (see below) to aquatic organisms is inversely proportional to the total hardness concentration. As a result, numeric water quality standards for certain metals vary with the total hardness of the water.

pH. The pH, which is $-\log [H^+]$, is universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters ranges between 6 and 9. Extremes of pH can have deleterious effects on aquatic systems. Also, the toxicity of ammonia to aquatic organisms is highly pH dependent.

Total Dissolved Solids (TDS). The dissolved solids in water consist of inorganic and organic molecules and ions that are in true solution. In fresh water the total dissolved solids concentration typically ranges from 20 to 1,000 mg/l; in seawater it ranges from 30,000 to 35,000 mg/l. Elevated levels of dissolved solids can deleteriously affect water quality in a number of ways, most often because of the increased concentration (and perhaps increased number) of constituents that may be toxic to aquatic organisms.

Total Suspended Solids (TSS). Solids can be present in the water column in a dissolved phase or a suspended phase (TSS). In general, suspended solids are considered a pollutant when they significantly exceed natural concentrations and have a detrimental effect on the beneficial uses designated for the receiving water.

Suspended solids can absorb and scatter sunlight, deleteriously affecting the zone where photosynthesis occurs and, ultimately, the availability of food for plankton eating organisms; the associated turbidity can also decrease sight-feeding. Suspended solids can also physically interfere with the respiratory and feeding systems of aquatic organisms. Depending on the size-distribution of the particles and the velocity of the water, a portion of the suspended solids load will settle out of the water column; these settled solids can disrupt biological communities by blanketing benthic habitats (including gravel spawning beds) or by physically changing the pattern of the channel, leading to changes in the hydraulic regime.

Metal ions and charged organic compounds can sorb to the surfaces of particles. Where contaminated particles settle out in calm water, and where the chemical and physical factors that affect pore-water chemistry are favorable, sediments can expose interstitial organisms to concentrations of pollutants considered deleterious to aquatic life.

The major sources of suspended solids for Caltrans Districts include natural erosion, runoff from construction sites and other operations where the surface of the ground is disturbed. In addition, increased discharge volumes, as a result of developing impervious surfaces can accelerate the process of channel erosion, which in turn can increase total suspended (and dissolved) solids in runoff.

Temperature. Temperature must be known to determine the impact of ammonia toxicity in water. Water quality criteria for ammonia for the protection of freshwater aquatic life varies with temperature and pH. In general, un-ionized ammonia is most toxic to sensitive coldwater species at pH levels between 6.5 and 6.8 with corresponding temperatures between 0 and 5°C. Total ammonia is most toxic to sensitive coldwater species at pH levels between 8.8 and 9.0 with corresponding temperatures between 25 and 30°C.

TOC/DOC. Total Organic Carbon/Dissolved Organic Carbon are general indicators of the organic content of a sample. They also serve as correction factors for water quality objectives, in the same manner that hardness is used as a correction factor for metals criteria.

► NUTRIENTS

Excessive inputs of nutrients such as nitrogen and phosphorus to receiving waters can over-stimulate the growth of aquatic plants (algae and vascular plants), which can cause numerous deleterious effects. Algae and vascular aquatic plants produce oxygen during the day via photosynthesis and consume oxygen during the night via respiration. The pH of the water is linked to this phenomenon through the carbonate cycle: the pH rises during the day when CO₂ is consumed for the photosynthetic production of plant tissue and falls at night when CO₂ is released by respiration. Algal blooms due to inputs of nitrogen or phosphorus can cause wide fluctuations in this dissolved oxygen and pH cycle during a 24 hour period, which can cause fish kills and mass mortality of benthic organisms. In addition, excessive algal and vascular plant growth can accelerate eutrophication, interfere with navigation, and cause unsightly conditions with reduced water clarity, odors, and diminished habitat for fish and shellfish.

Nutrients generally have more adverse effects in water bodies with slow flushing rates, such as slow moving streams and lakes. Also, nutrients associated with suspended solids in stormwater runoff that settle out may later be solubilized and cause problems that were not at first apparent.

Other trace nutrients, such as iron, are also needed for plant growth. In general, however, nitrogen and phosphorus are the nutrients of importance in aquatic environments.

Phosphorus. Phosphorus is taken up by algae and vascular aquatic plants and, when available in excess of the plant's immediate needs for metabolism and reproduction, can be stored in the cells. With bacterial decomposition of plant materials, relatively labile pools of phosphorus are later released and recycled within the biotic community. The refractory portion (i.e., compounds relatively resistant to biodegradation) tends to sink to the bottom, where it degrades slowly over time.

Sources of phosphorus that may impact highway runoff include tree leaves, lubricants, and natural sources such as the mineralized organic matter in soils.

Phosphorus is present in one of three forms in stormwater discharges as dissolved or particulate:

- Orthophosphate (PO₄³⁻)
- Polyphosphate (P₆O₃³⁻, P₃O₁₀⁵⁻, and P₂O₇⁴⁻)
- Organic phosphorus

Analytical tests for the minimum constituent list include total phosphorus (TP), which is the sum of the dissolved and particulate orthophosphate, polyphosphate and organic phosphorus; and dissolved orthophosphate (Ortho-P). All forms of phosphorus should be

reported in concentration units of the mass of elemental phosphorus detected per unit volume.

Nitrogen. Nitrogen can exist in various forms in the environment due to changes in its oxidation states. The principal forms of nitrogen are:

	<u>Nitrogen Compound</u>	<u>Formula</u>	<u>Oxidation State</u>
a.	Organic nitrogen	Organic-N	-3
b.	Ammonia	NH ₃	-3
c.	Ammonium ion	NH ₄ ⁺	-3
d.	Nitrogen gas	N ₂	0
e.	Nitrite ion	NO ₂ ²⁻	+3
f.	Nitrate ion	NO ₃ ⁻	+5

Transformation of the above nitrogen compounds can occur through several key mechanisms: fixation, ammonification, synthesis, nitrification, and denitrification (Sawyer et al., 1994, Kayhanian and Tchbanoglous, 1998). Nitrogen fixation is the conversion of nitrogen gas into nitrogen compounds that can be assimilated by plants; biological fixation is the most common, but fixation can also occur by lightning, and through industrial processes. Ammonification is the biochemical degradation of organic-N into NH₃ or NH₄⁺ by heterotrophic bacteria under aerobic or anaerobic conditions. Synthesis is the biochemical mechanism in which NH₄⁺-N or NO₃⁻-N is converted into plant protein (Organic-N); nitrogen fixation is also a unique form of synthesis that can only be performed by nitrogen-fixing bacteria. Nitrification is the biological oxidation of NH₄⁺ to NO₃⁻ through a two-step autotrophic process by the bacteria *Nitrosomonas* and *Nitrobacter*; the two-step reactions are usually very rapid and hence it is rare to find nitrite levels higher than 1.0 mg/l in water. The nitrate formed by nitrification is, in the nitrogen cycle, used by plants as a nitrogen source (synthesis) or reduced to N₂ gas through the process of denitrification; NO₃⁻ can be reduced, under anoxic conditions, to N₂ gas through heterotrophic biological denitrification.

Potential sources of nitrogen in highway runoff include atmospheric fallout, nitrite discharges from automobile exhausts, fertilizer runoff, and natural sources such as mineralized soil organic matter (Fraser and Cass, 1998).

Nitrogen is typically present in one of three forms in stormwater discharges:

- Oxidized inorganic forms, nitrate- plus nitrite-nitrogen (NO₃⁻-N, NO₂⁻-N)
- Reduced inorganic form, ammonia/ammonium-nitrogen (NH₃/NH₄⁺-N)
- Reduced organic form, organic nitrogen (Org-N)

Analytical tests for the minimum constituent list include NH₃/NH₄⁺-N, NO₃⁻-N, and Total Kjeldahl Nitrogen (TKN). TKN is a measure of NH₃/NH₄⁺-N plus organic-N; the

concentration of organic-N is thus obtained by subtracting the concentration of $\text{NH}_3/\text{NH}_4^+$ -N found in the sample from that of the TKN value. All forms of nitrogen should be reported in units of the mass of elemental nitrogen detected per unit volume.

► METALS (TOTAL AND DISSOLVED)

Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Zinc (As, Cd, Cr, Cu, Ni, Pb, Zn). Trace quantities of many metals are necessary for biological growth. Most metals, however, have numeric water quality standards because of their toxicity to aquatic organisms at high concentrations. The monitoring of metals is very important to control their potential deleterious effects on the beneficial uses of receiving waters.

Metals exist in stormwater runoff in the dissolved phase and adsorbed to suspended solids. Information regarding the partitioning of metals between the dissolved and particulate phase is important for selecting control measures. For example, if a large portion of total metals exist in the particulate phase, it may be possible to remove them through sedimentation or filtration. For this reason metals should always be analyzed for both the total and dissolved fractions.

Possible sources of metals in highway runoff include the combustion of fossil fuels, weathering of automotive tires and brake pads, and the corrosion of metals, paints, and solder. Metals can also reach receiving waters through the natural weathering of rock and soil erosion

As described above, the toxicity of some metals is inversely related to water hardness. The numeric water quality standards for cadmium, chromium, copper, lead, nickel, silver, and zinc are hardness-dependent. Copper, lead, and zinc are the metals most commonly found in highway runoff.

► DATA SUMMARY

Table B-1 contains a summary of all Caltrans runoff monitoring data compiled in the Caltrans Statewide Stormwater Database from monitoring conducted during the years 1997-99.

► WATER QUALITY OBJECTIVES

Table B-2 is comprised of a summary of the water quality objectives contained within the California Toxics Rule for inland surface waters and the California Ocean Plan for salt waters.

Table B-1. Data Reported in Caltrans Monitoring Projects 1997-99.

Constituent	Fraction	# of samples	Percent Detected	Reported Value		Units	Source ¹
				Min	Max		
Conventional							
Ba	Total	125	86.4	0.01	10.0	mg/L	H
BOD	Total	34	76.5	2.0	37.0	mg/L	H
Ca	Total	95	100	3.1	305	mg/L	H
Chlorine residual	Total	21	66.7	ND	17.0	mg/L	H
Cl	Total	69	89.9	0.13	35.0	mg/L	H
COD	Total	327	98.2	6.0	600	mg/L	H
EC	Total	520	100	10.0	16000	umhos/cm	C, H
Hardness as CaCO3	Total	608	99.7	3.3	7520.0	mg/L	H, B
Na	Diss	6	83.3	1.0	54.0	mg/L	H
Na	Total	12	83.3	1.0	56.0	mg/L	H
pH	Total	608	100	5.4	764	pH units	H
Salinity	Total	12	100	0.02	0.25	mg/L	B
SO4	Total	46	93.5	0.2	25.1	mg/L	H
SO4	NR	32	75.0	2.0	72.0	mg/L	H
TDS		358	100	11.0	11700	mg/L	H, C, M, P
Temperature		103	100	6.6	28.6	°C	H
TOC		271	100	0.6	350.1	mg/L	H
TSS		1339	96.9	1.0	29000	mg/L	C, H, M, P
Turbidity		205	100	0.4	16000	NTU	C, H, M, P
TVSS		185	98.9	5.0	928	mg/L	H
Hydrocarbons							
Oil & Grease		280	64.3	1.0	226	mg/L	H, M, P
TEPH		692	98.1	0.73	13000	mg/L	H
TPH (Diesel)		880	19.0	0.1	2600	mg/L	B
TPH (Gasoline)		748	87.0	ND	ND	mg/L	H
TPH (Heavy Oil)		46	95.7	0.1	3.8	mg/L	H
TPH (Jet Fuel)		576	0.00	ND	ND	mg/L	H
TPH (Kerosene)		576	0.00	ND	ND	mg/L	H
TPH (Motor oil)		32	43.8	0.3	10.0	mg/L	B
TPH (Stoddard Solvent)		576	0.00	ND	ND	mg/L	H
TRPH		129	45.7	1.0	58000	mg/L	H, M, P
TVPH		600	46.0	0.05	8.7	mg/L	H
Metals							
Ag	Diss	249	2.00	0.04	3030	µg/L	H
Ag	Total	382	8.64	0.15	930	µg/L	H
Al	Diss	41	82.9	25.0	2500	µg/L	H
Al	Total	41	100	29.0	12600	µg/L	H
As	Diss	80	57.5	0.39	15.0	µg/L	C
As	Total	263	32.7	0.22	2300	µg/L	C
Be	Diss	14	0.00	ND	ND	µg/L	H
Be	Total	80	23.0	1.0	25.0	µg/L	H
Cd	Diss	515	43.7	0.02	6.1	µg/L	H
Cd	Total	650	78.0	0.1	160	µg/L	H
Co	Total	60	78.3	0.05	0.36	mg/L	H
Cr	Diss	578	70.9	0.55	50.0	µg/L	H, M
Cr	Total	1578	93.9	0.46	1890000	µg/L	H, M
Cu	Diss	671	95.7	1.0	140	µg/L	H, M
Cu	Total	1736	96.9	0.17	9330000	µg/L	H, M
Fe	Diss	53	35.8	75.0	7500	µg/L	H
Fe	Total	53	100.0	390	24000	µg/L	H
Hg	Diss	91	0.00	ND	ND	µg/L	B, other
Hg	Total	154	3.25	0.14	5.0	µg/L	B, other
Mg	Diss	12	75.0	360	9800	µg/L	H

Table B-1. Data Reported in Caltrans Monitoring Projects 1997-99 (continued).

Constituent	Fraction	# of samples	Percent Detected	Reported Value		Units	Source ¹
				Min	Max		
Metals (continued)							
Mg	Total	103	96.1	0.74	21800	µg/L	H
Mo	Total	60	77.0	0.03	38.0	mg/L	H
Ni	Diss	568	65.3	0.47	2340	µg/L	H, M
Ni	Total	694	85.0	0.28	6570	µg/L	H, M
Pb	Diss	670	69.0	0.2	300	µg/L	H, M
Pb	Total	1733	95.3	0.13	3340000	µg/L	H, M
Sb	Diss	14	78.6	1.0	3.4	µg/L	H
Sb	Total	80	47.5	1.0	570	µg/L	H
Se	Diss	55	10.9	0.14	5.0	µg/L	H
Se	Total	186	6.99	0.31	1000	µg/L	H
Tl	Diss	14	0.00	ND	ND	µg/L	H
Tl	Total	80	3.75	1.0	2500	µg/L	H
V	Total	60	78.3	0.1	44.0	mg/L	H
Zn	Diss	670	89.0	2.0	3320	µg/L	H, M
Zn	Total	1735	98.8	2.5	5690000	µg/L	H, M
Microbiological							
Fecal Coliform	Total	310	87.7	2.0	205000	MPN/100 ml	H
Fecal Sterol	Total	39	59.0	0.03	4.64	µg/L	H
Fecal Strep	Total	50	100.0	54.0	220000	MPN/100 ml	H
Total Coliform		187	98.9	2.0	540000	MPN/100 ml	H
Bioassay	Total	51	92.2	ND	100	% Survival	H
Nutrients							
NH3	Total	1	100.0	0.85	0.85	mg/L	H, M
NH3-N	Diss	113	100.0	ND	0.21	mg/L	H, M
NH3-N	Total	284	88.7	0.05	20.2	mg/L	H, M
NO2-N	Total	162	45.1	0.01	1300	mg/L	H
NO2-N	NR	92	38.0	0.1	7.0	mg/L	H
NO3-N	Diss	114	100	ND	146	mg/L	H, B, M
NO3-N	Total	419	93.3	0.1	3310	mg/L	H, B, M
NO3-N	NR	192	94.3	0.1	58.0	mg/L	H, B, M
Organic Nitrogen	Total	48	93.8	0.01	6310	mg/L	H
Organic Nitrogen	NR	6	100	0.36	7.4	mg/L	H
Total N	Total	1	100	4.0	4.0	mg/L	H, M
Ortho-P	Diss	196	96.4	0.01	790	mg/L	H, M
Ortho-P	Total	139	92.8	0.04	6.0	mg/L	H, M
Ortho-P	NR	92	96.7	0.03	11.0	mg/L	H, M
P	Diss	412	73.3	ND	7.0	mg/L	H, M, Other
P	Total	677	89.2	0.01	10700	mg/L	H, M
TKN	Total	552	84.1	0.17	57.0	mg/L	
TKN	NR	129	99.2	0.7	17.0	mg/L	H, M
Pesticides							
2,4,5-T	Total	69	0.00	ND	ND	ug/L	H
2,4,5-TP (Silvex)	Total	69	0.00	ND	ND	ug/L	H
2,4-D	Total	69	0.00	ND	ND	ug/L	H
2,4-DB	Total	69	0.00	ND	ND	ug/L	H
2,4-DP	Total	38	0.00	ND	ND	ug/L	H
4,4' DDD	Total	98	0.00	ND	ND	ug/L	C
4,4' DDE	Total	98	0.00	ND	ND	ug/L	C, H
4,4' DDT	Total	98	0.00	ND	ND	ug/L	C, H
4,6-Dinitro-2-methylphenol	Total	41	0.00	ND	ND	ug/L	C, H
4-chloro-3-methylphenol	Total	41	0.00	ND	ND	ug/L	C
Alachlor	Total	2	0.00	ND	ND	ug/L	C
Aldrin	Total	98	0.00	ND	ND	ug/L	H

Table B-1. Data Reported in Caltrans Monitoring Projects 1997-99 (continued).

Constituent	Fraction	# of samples	Percent Detected	Reported Value		Units	Source ¹
				Min	Max		
Pesticides (continued)							
alpha-BHC	Total	98	0.00	ND	ND	ug/L	H
alpha-chlordane	Total	21	0.00	ND	ND	ug/L	H
alpha-Endosulfan	Total	98	0.00	ND	ND	ug/L	H
Arochlor 1016	Total	98	0.00	ND	ND	ug/L	H
Arochlor 1221	Total	98	0.00	ND	ND	ug/L	H
Arochlor 1232	Total	98	0.00	ND	ND	ug/L	H
Arochlor 1242	Total	98	0.00	ND	ND	ug/L	H
Arochlor 1248	Total	98	0.00	ND	ND	ug/L	H
Arochlor 1254	Total	98	0.00	ND	ND	ug/L	H
Arochlor 1260	Total	98	0.00	ND	ND	ug/L	H
Atrazine	Total	78	0.00	ND	ND	ug/L	H
Azinphos methyl	Total	31	0.00	ND	ND	ug/L	H
beta-BHC	Total	98	0.00	ND	ND	ug/L	H
beta-Endosulfan	Total	98	0.00	ND	ND	ug/L	H
Bolstar (Sulprofos)	Total	31	0.00	ND	ND	ug/L	H
Bromacil	Total	33	18.2	0.8	5.0	ug/L	H
Carbon disulfide	Total	17	5.88	0.5	4.0	ug/L	H
Chlordane	Total	83	2.00	0.2	0.4	ug/L	H
Chlorpyrifos	Total	265	45.3	ND	1.0	ug/L	H
Chlorsulfuron	Total	26	0.00	ND	ND	ug/L	H
Coumaphos	Total	31	0.00	ND	ND	ug/L	H
Cyanazine	Total	2	0.00	ND	ND	ug/L	H
Dalapon	Total	69	0.00	ND	ND	ug/L	H
delta-BHC	Total	98	0.00	ND	ND	ug/L	H
Demeton-O and S	Total	62	0.00	ND	ND	ug/L	H
Di(2-Ethylhexyl)phthalate	Total	41	12.2	4.0	19.0	ug/L	H
Diazinon	Total	265	58.5	0.01	2.4	ug/L	C
Dibenzo(a,h)Anthracene	Total	119	0.00	ND	ND	ug/L	H
Dicamba	Total	69	0.00	ND	ND	ug/L	B
Dichlorobromomethane	Total	17	0.00	ND	ND	ug/L	H
Dichlorodifluoromethane	Total	17	0.00	ND	ND	ug/L	H
Dichloroprop	Total	31	0.00	ND	ND	ug/L	H
Dichlorvos	Total	31	0.00	ND	ND	ug/L	H
Dieldrin	Total	98	0.00	ND	ND	ug/L	H
Dimethoate	Total	2	0.00	ND	ND	ug/L	H
Dinoseb (DNBP)	Total	69	0.00	ND	ND	ug/L	H
Diquat	Total	37	0.00	ND	ND	ug/L	H
Disulfoton	Total	31	0.00	ND	ND	ug/L	H
Diuron	Total	33	24.2	1.0	180	ug/L	H
Endosulfan sulfate	Total	98	2.00	0.02	0.4	ug/L	H
Endrin	Total	98	0.00	ND	ND	ug/L	M
Endrin Aldehyde	Total	98	0.00	ND	ND	ug/L	H
Endrin Ketone	Total	25	0.00	ND	ND	ug/L	H
Epicoprostonal	Total	9	77.8	0.08	5.0	ug/L	H
Ethoprop	Total	31	0.00	ND	ND	ug/L	H
Fensulfothion	Total	31	0.00	ND	ND	ug/L	H
Fenthion	Total	31	0.00	ND	ND	ug/L	H
Fluozifop-p-butyl	Total	25	0.00	ND	ND	ug/L	H
gamma-BHC	Total	98	0.00	ND	ND	ug/L	H
gamma-Chlordane	Total	25	0.00	ND	ND	ug/L	H
Glyphosate	Total	43	60.5	5.0	530	ug/L	H
Heptachlor	Total	98	2.00	0.01	0.2	ug/L	H
Heptachlor Epoxide	Total	98	2.00	0.01	0.2	ug/L	H

Table B-1. Data Reported in Caltrans Monitoring Projects 1997-99 (continued).

Constituent	Fraction	# of samples	Percent Detected	Reported Value		Units	Source ¹
				Min	Max		
Pesticides (continued)							
Isoxaben	Total	6	0.00	ND	ND	ug/L	H
Malathion	Total	85	0.00	ND	ND	ug/L	H
MCPA	Total	31	0.00	ND	ND	ug/L	M
MCPP	Total	31	0.00	ND	ND	ug/L	H
Merphos	Total	31	0.00	ND	ND	ug/L	H
Methoxychlor	Total	98	0.00	ND	ND	ug/L	H
Metolachlor	Total	76	0.00	ND	ND	ug/L	H
Mirex	Total	63	0.00	0.05	223000	ug/L	H
Molinate	Total	2	0.00	ND	ND	ug/L	C
Naled	Total	31	0.00	ND	ND	ug/L	H
Oryzalin	Total	33	6.06	0.5	10.0	ug/L	H
Oxadiazon	Total	34	55.9	0.04	18.0	ug/L	H
Oxamyl	Total	7	0.00	ND	ND	ug/L	H
Oxyflufen	Total	20	0.00	ND	ND	ug/L	H
Paraquat	Total	29	0.00	ND	ND	ug/L	H
Parathion, methyl	Total	31	0.00	ND	ND	ug/L	H
PCBs (total)	Total	19	0.00	ND	ND	ug/L	H
Phorate	Total	31	0.00	ND	ND	ug/L	H
Prometon	Total	76	0.00	ND	ND	ug/L	H
Prometryn	Total	2	0.00	ND	ND	ug/L	H
Prowl	Total	1	100	0.79	0.79	ug/L	H
Pyridine	Total	6	0.00	ND	ND	ug/L	H
Ronnel	Total	31	0.00	ND	ND	ug/L	H
Simazine	Total	87	2.30	0.07	3170	ug/L	H
Stirophos (Tetrachlorvinphos)	Total	31	0.00	ND	ND	ug/L	H
Sulfometuron-methyl	Total	26	0.00	ND	ND	ug/L	H
Tetrahydrofuran	Total	17	0.00	ND	ND	ug/L	H
Thiobencarb	Total	2	0.00	ND	ND	ug/L	H
Tokuthion (Prothiofos)	Total	31	0.00	ND	ND	ug/L	H
Toxaphene	Total	98	0.00	ND	ND	ug/L	H
Trichlopyr	Total	26	26.9	0.1	4.2	ug/L	H
Trichloronate	Total	31	0.00	ND	ND	ug/L	H
Semi-volatile and non-volatile organic compounds							
1,2,4-Trichlorobenzene	Total	110	0.00	ND	ND	ug/L	H
1,2-Diphenylhydrazine	Total	91	0.00	ND	ND	ug/L	H
2,4,5-Trichlorophenol	Total	83	0.00	ND	ND	ug/L	H
2,4,6-Trichlorophenol	Total	84	0.00	ND	ND	ug/L	H
2,4-Dichlorophenol	Total	84	0.00	ND	ND	ug/L	H
2,4-Dimethylphenol	Total	84	0.00	ND	ND	ug/L	H
2,4-Dinitrophenol	Total	84	0.00	ND	ND	ug/L	H
2,4-Dinitrotoluene	Total	110	0.00	ND	ND	ug/L	H
2,6-Dinitrotoluene	Total	110	0.00	ND	ND	ug/L	H
2-Chloronaphthalene	Total	110	0.00	ND	ND	ug/L	H
2-Chlorophenol	Total	84	0.00	ND	ND	ug/L	H
2-Methyl-4,6-Dinitrophenol	Total	43	0.00	ND	ND	ug/L	H
2-Methylnaphthalene	Total	109	0.00	ND	ND	ug/L	H
2-Methylphenol (o-Cresol)	Total	64	0.00	ND	ND	ug/L	H
2-Nitroaniline	Total	109	0.00	ND	ND	ug/L	H
2-Nitrophenol	Total	84	0.00	ND	ND	ug/L	H
3,3-Dichlorobenzidine	Total	110	0.00	ND	ND	ug/L	H
3-Methyl 4-Chlorophenol	Total	43	0.00	ND	ND	ug/L	H
3-Nitroaniline	Total	109	0.00	ND	ND	ug/L	H
4-Bromophenyl Phenyl Ether	Total	110	0.00	ND	ND	ug/L	H

Table B-1. Data Reported in Caltrans Monitoring Projects 1997-99 (continued).

Constituent	Fraction	# of samples	Percent Detected	Reported Value		Units	Source ¹
				Min	Max		
Constituent							
Semi-volatile and non-volatile organic compounds (continued)							
4-Chloroaniline	Total	109	0.00	ND	ND	ug/L	H
4-Chlorophenyl Phenyl Ether	Total	110	0.00	ND	ND	ug/L	H
4-Methylphenol (p-Cresol)	Total	83	2.0	5.0	50.0	ug/L	H
4-Nitroaniline	Total	109	0.00	ND	ND	ug/L	H
4-Nitrophenol	Total	84	0.00	ND	ND	ug/L	H
Acenaphthene	Total	119	0.84	0.5	30.0	ug/L	H
Acenaphthylene	Total	119	0.00	ND	ND	ug/L	H
Aniline	Total	90	7.78	5.0	30.0	ug/L	B
Anthracene	Total	119	0.84	0.02	30.0	ug/L	H
Benzidine	Total	91	1.00	50.0	500	ug/L	C
Benzo(a)anthracene	Total	119	68.0	0.02	30.0	ug/L	H
Benzo(a)pyrene	Total	119	0.00	ND	ND	ug/L	H
Benzo(b)fluoranthene	Total	119	0.84	0.02	30.0	ug/L	B
Benzo(ghi)Perylene	Total	119	0.00	ND	ND	ug/L	C
Benzo(k)fluoranthene	Total	119	0.00	ND	ND	ug/L	B
Benzoic acid	Total	83	10.8	25.0	310	ug/L	B
Benzyl alcohol	Total	83	2.00	5.0	50.0	ug/L	H
Bis(2-Chloroethoxy)Methane	Total	110	0.00	ND	ND	ug/L	H
Bis(2-Chloroethyl)Ether	Total	110	0.00	ND	ND	ug/L	H
Bis(2-Chloroisopropyl)Ether	Total	110	0.00	ND	ND	ug/L	H
Bis(2-Ethylhexyl)Phthalate	Total	69	36.2	4.0	50.0	ug/L	H
Butylbenzyl Phthalate	Total	110	0.00	ND	ND	ug/L	H
Carbazole	Total	19	0.00	ND	ND	ug/L	H
Chrysene	Total	119	0.00	ND	ND	ug/L	H
Dibenzofuran	Total	109	0.00	ND	ND	ug/L	B
Diethyl Phthalate	Total	110	0.00	ND	ND	ug/L	H
Dimethyl Phthalate	Total	110	0.00	ND	ND	ug/L	H
Di-n-Butyl Phthalate	Total	110	0.91	10.0	66.0	ug/L	H
Di-n-Octyl Phthalate	Total	110	0.00	ND	ND	ug/L	H
Fluoranthene	Total	119	0.00	ND	ND	ug/L	H
Fluorene	Total	119	0.00	ND	ND	ug/L	B
Hexachlorobenzene	Total	110	0.00	ND	ND	ug/L	B
Hexachlorobutadiene	Total	110	0.00	ND	ND	ug/L	H
Hexachlorocyclopentadiene	Total	110	0.00	ND	ND	ug/L	H
Hexachloroethane	Total	110	0.00	ND	ND	ug/L	H
Indeno(1,2,3-c,d)Pyrene	Total	119	0.00	ND	ND	ug/L	H
Isophorone	Total	110	0.00	ND	ND	ug/L	B
Naphthalene	Total	119	3.36	0.5	2400	ug/L	H
Nitrobenzene	Total	110	0.00	ND	ND	ug/L	B
N-Nitrosodimethylamine	Total	91	0.00	ND	ND	ug/L	H
N-Nitrosodi-n-Propylamine	Total	91	0.00	ND	ND	ug/L	H
N-Nitrosodiphenylamine	Total	110	0.00	ND	ND	ug/L	H
Pentachlorophenol	Total	84	0.00	ND	ND	ug/L	H
Phenanthrene	Total	119	3.36	0.05	740	ug/L	H
Phenol	Total	84	3.57	5.0	1450	ug/L	B
Phenolics	Total	39	35.9	10.0	264.0	ug/L	H
Pyrene	Total	119	0.84	0.05	2540	ug/L	H
Volatile organic compounds							
1,1,1-Trichloroethane	Total	23	0.00	ND	ND	ug/L	H
1,1,2,2-Tetrachloroethane	Total	23	0.00	ND	ND	ug/L	H
1,1,2-Trichloroethane	Total	23	0.00	ND	ND	ug/L	H
1,1-Dichloroethane	Total	23	0.00	ND	ND	ug/L	H
1,1-Dichloroethylene	Total	23	0.00	ND	ND	ug/L	H

Table B-1. Data Reported in Caltrans Monitoring Projects 1997-99 (continued).

Constituent	Fraction	# of samples	Percent Detected	Reported Value		Units	Source ¹
				Min	Max		
Constituent							
Volatile organic compounds (continued)							
1,2-Dichlorobenzene	Total	123	0.00	ND	ND	ug/L	H
1,2-Dichloroethane	Total	23	0.00	ND	ND	ug/L	H
1,2-Dichloropropane	Total	23	0.00	ND	ND	ug/L	H
1,2-Trans-Dichloroethylene	Total	23	0.00	ND	ND	ug/L	H
1,3-Dichlorobenzene	Total	121	0.00	ND	ND	ug/L	H
1,4-Dichlorobenzene	Total	119	0.00	ND	ND	ug/L	H
2-Butanone (Methylethyl ketone)	Total	17	18.0	10.0	15.0	ug/L	H
2-Chloroethylvinyl ether	Total	17	0.00	ND	ND	ug/L	H
2-Hexanone	Total	17	0.00	ND	ND	ug/L	H
4-Methyl-2-Pentanone (MIBK)	Total	17	0.00	ND	ND	ug/L	H
Acetone	Total	17	70.6	10.0	56.0	ug/L	H
Acrolein	Total	23	0.00	ND	ND	ug/L	H
Acrylonitrile	Total	23	0.00	ND	ND	ug/L	H
Benzene	Total	612	33.7	ND	ND	ug/L	H
Bromoform	Total	23	0.00	ND	ND	ug/L	H
Carbon Tetrachloride	Total	23	0.00	ND	ND	ug/L	H
Chlorobenzene	Total	23	0.00	ND	ND	ug/L	H
Chlorodibromomethane	Total	29	0.00	ND	ND	ug/L	H
Chloroethane	Total	23	0.00	ND	ND	ug/L	H
Chloroform	Total	23	0.00	ND	ND	ug/L	H
cis-1,2-Dichloroethene	Total	17	0.00	ND	ND	ug/L	H
cis-1,3-Dichloropropene	Total	23	0.00	ND	ND	ug/L	H
Ethylbenzene	Total	612	25.3	ND	ND	ug/L	H
M,P-XYLENES	Total	7	0.00	ND	ND	ug/L	H
Methyl Bromide	Total	17	0.00	ND	ND	ug/L	H
Methyl Chloride	Total	23	0.00	ND	ND	ug/L	H
Methylene Chloride	Total	23	13.0	2.0	6.6	ug/L	H
Methyl-t-butyl ether (MTBE)	Total	45	8.89	0.9	5.0	ug/L	H
o-Xylene	Total	17	0.00	ND	ND	ug/L	H
Styrene	Total	17	0.00	ND	ND	ug/L	H
Tetrachloroethylene	Total	23	0.00	ND	ND	ug/L	H
Toluene	Total	612	43.1	0.5	7200	ug/L	H
trans-1,3-Dichloropropene	Total	23	0.00	ND	ND	ug/L	M
Trichloroethylene (TCE)	Total	23	0.00	ND	ND	ug/L	H
Trichlorofluoromethane	Total	17	0.00	ND	ND	ug/L	H
Vinyl Acetate	Total	17	0.00	ND	ND	ug/L	H
Vinyl Chloride	Total	23	0.00	ND	ND	ug/L	H
Xylenes (total)	Total	599	47.6	0.5	1500	ug/L	H

¹ As reported to the Caltrans Statewide Stormwater Database for the years 1997-1999: B = BMP,

C = construction site, H = highway, M = maintenance facility, P = Park and Ride lot

NR = "not reported"

ND = "not detected"

Table B-2. California Toxics Rule and Ocean Plan Water Quality Objectives for Potential Constituents in Caltrans Monitoring Projects.

	<i>Fraction</i>	<i>CTR (µg/L)</i>	<i>Ocean Plan (µg/L)</i>
<i>Constituent</i>			
Metals			
Ag	Diss	(1a)	7 ⁽¹⁾
Ag	Total	n/a	n/a
Al	Diss	n/a	n/a
Al	Total	n/a	n/a
As	Diss	(1a)	80 ⁽¹⁾
As	Total	n/a	n/a
Be	Diss	n/a	0.033
Be	Total	n/a	n/a
Cd	Diss	(1a)	10 ⁽¹⁾
Cd	Total	n/a	n/a
Co	Total	n/a	n/a
Cr	Diss	(1a)	20(VI) ⁽¹⁾ , 190000(III)
Cr	Total	n/a	n/a
Cu	Diss	(1a)	30 ⁽¹⁾
Cu	Total	(1a)	n/a
Fe	Diss	n/a	n/a
Fe	Total	n/a	n/a
Hg	Diss	n/a	0.4 ⁽¹⁾
Hg	Total	(1a)	n/a
Mg	Diss	n/a	n/a
Mg	Total	n/a	n/a
Mo	Total	n/a	n/a
Ni	Diss	(1a)	50 ⁽¹⁾
Ni	Total	(1a)	n/a
Pb	Diss	(1a)	20 ⁽¹⁾
Pb	Total	n/a	n/a
Sb	Diss	n/a	1200
Sb	Total	(1a)	n/a
Se	Diss	n/a	150 ⁽¹⁾
Se	Total	(1a)	n/a
Tl	Diss	n/a	14
Tl	Total	(1a)	n/a
V	Total	n/a	n/a
Zn	Diss	(1a)	200 ⁽¹⁾
Zn	Total	n/a	n/a
Nutrients			
NH3-N	Diss	n/a	6000 ⁽¹⁾
Pesticides			
2,4,5-T	Total	n/a	n/a
2,4,5-TP (Silvex)	Total	n/a	n/a
2,4-D	Total	n/a	n/a
2,4-DB	Total	n/a	n/a
2,4-DP	Total	n/a	n/a
4,4' DDD	Total	0.00083	n/a
4,4' DDE	Total	0.00059	n/a

Table B-2. California Toxics Rule and Ocean Plan Water Quality Objectives for Potential Constituents in Caltrans Monitoring Projects (continued).

	<i>Fraction</i>	<i>CTR (µg/L)</i>	<i>Ocean Plan (µg/L)</i>
<i>Constituent</i>			
Pesticides (continued)			
4,4' DDT	Total	0.00059	0.00017 ⁽²⁾
4,6-Dinitro-2-methylphenol	Total	n/a	220
4-chloro-3-methylphenol	Total	n/a	n/a
Alachlor	Total	n/a	n/a
Aldrin	Total	0.00013	0.000022
alpha-BHC	Total	0.0039	n/a
alpha-chlordane	Total	n/a	n/a
alpha-Endosulfan	Total	110	n/a
Arochlor 1016	Total	n/a	*
Arochlor 1221	Total	n/a	*
Arochlor 1232	Total	n/a	*
Arochlor 1242	Total	n/a	*
Arochlor 1248	Total	n/a	*
Arochlor 1254	Total	n/a	*
Arochlor 1260	Total	n/a	*
Atrazine	Total	n/a	n/a
Azinphos methyl	Total	n/a	n/a
beta-BHC	Total	0.014	n/a
beta-Endosulfan	Total	110	n/a
Bolstar (Sulprofos)	Total	n/a	n/a
Bromacil	Total	n/a	n/a
Carbon disulfide	Total	n/a	n/a
Chlordane	Total	0.00057	0.000023
Chlorpyrifos	Total	n/a	n/a
Chlorsulfuron	Total	n/a	n/a
Coumaphos	Total	n/a	n/a
Cyanazine	Total	n/a	n/a
Dalapon	Total	n/a	n/a
delta-BHC	Total	n/a	n/a
Demeton-O and S	Total	n/a	n/a
Di(2-Ethylhexyl)phthalate	Total	n/a	n/a
Diazinon	Total	n/a	n/a
Dibenzo(a,h)Anthracene	Total	0.0044	n/a
Dicamba	Total	n/a	n/a
Dichlorobromomethane	Total	0.56	n/a
Dichlorodifluoromethane	Total	n/a	n/a
Dichloroprop	Total	n/a	n/a
Dichlorvos	Total	n/a	n/a
Dieldrin	Total	0.00014	0.00004
Dimethoate	Total	n/a	n/a
Dinoseb (DNBP)	Total	n/a	n/a
Diquat	Total	n/a	n/a
Disulfoton	Total	n/a	n/a
Diuron	Total	n/a	n/a
Endosulfan sulfate	Total	110	0.027 ^{(1),(3)}

Table B-2. California Toxics Rule and Ocean Plan Water Quality Objectives for Potential Constituents in Caltrans Monitoring Projects (continued).

	<i>Fraction</i>	<i>CTR (µg/L)</i>	<i>Ocean Plan (µg/L)</i>
Constituent			
Pesticides (continued)			
Endrin	Total	0.036	0.006 ⁽¹⁾
Endrin Aldehyde	Total	0.76	n/a
Endrin Ketone	Total	n/a	n/a
Epicoprastronal	Total	n/a	n/a
Ethoprop	Total	n/a	n/a
Fensulfothion	Total	n/a	n/a
Fenthion	Total	n/a	n/a
Fluozifop-p-butyl	Total	n/a	n/a
gamma-BHC	Total	0.019	n/a
gamma-Chlordane	Total	n/a	n/a
Glyphosate	Total	n/a	n/a
Halomethanes ⁽⁵⁾		n/a	130
Heptachlor	Total	0.00021	0.00072 ⁽⁶⁾
Heptachlor Epoxide	Total	0.0001	0.00072 ⁽⁶⁾
Isoxaben	Total	n/a	n/a
Malathion	Total	n/a	n/a
MCPA	Total	n/a	n/a
MCPP	Total	n/a	n/a
Merphos	Total	n/a	n/a
Methoxychlor	Total	n/a	n/a
Metolachlor	Total	n/a	n/a
Mirex	Total	n/a	n/a
Molinate	Total	n/a	n/a
Naled	Total	n/a	n/a
Oryzalin	Total	n/a	n/a
Oxadiazon	Total	n/a	n/a
Oxamyl	Total	n/a	n/a
Oxyflurfen	Total	n/a	n/a
Paraquat	Total	n/a	n/a
Parathion, methyl	Total	n/a	n/a
PCBs (total)	Total	0.00017	0.000019
Phorate	Total	n/a	n/a
Prometon	Total	n/a	n/a
Prometryn	Total	n/a	n/a
Prowl	Total	n/a	n/a
Pyridine	Total	n/a	n/a
Ronnel	Total	n/a	n/a
Simazine	Total	n/a	n/a
Stirophos (Tetrachlorvinphos)	Total	n/a	n/a
Sulfometuron-methyl	Total	n/a	n/a
Tetrahydrofuran	Total	n/a	n/a
Thiobencarb	Total	n/a	n/a
Tokuthion (Prothiofos)	Total	n/a	n/a
Toxaphene	Total	0.0002	0.00021
Trichlopyr	Total	n/a	n/a

Table B-2. California Toxics Rule and Ocean Plan Water Quality Objectives for Potential Constituents in Caltrans Monitoring Projects (continued).

	<i>Fraction</i>	<i>CTR (µg/L)</i>	<i>Ocean Plan (µg/L)</i>
<i>Constituent</i>			
Pesticides (continued)			
Trichloronate	Total	n/a	n/a
Semi-volatile and non-volatile organic compounds			
1,2,4-Trichlorobenzene	Total	n/a	n/a
1,2-Diphenylhydrazine	Total	0.04	0.16
2,4,5-Trichlorophenol	Total	n/a	n/a
2,4,6-Trichlorophenol	Total	2.1	0.29
2,4-Dichlorophenol	Total	93	n/a
2,4-Dimethylphenol	Total	540	n/a
2,4-Dinitrophenol	Total	70	4
2,4-Dinitrotoluene	Total	0.11	2.6
2,6-Dinitrotoluene	Total	n/a	n/a
2-Chloronaphthalene	Total	1700	n/a
2-Chlorophenol	Total	120	n/a
2-Methyl-4,6-Dinitrophenol	Total	13.4	n/a
2-Methylnaphthalene	Total	n/a	n/a
2-Methylphenol (o-Cresol)	Total	n/a	n/a
2-Nitroaniline	Total	n/a	n/a
2-Nitrophenol	Total	n/a	n/a
3,3-Dichlorobenzidine	Total	0.04	0.0081
3-Methyl 4-Chlorophenol	Total	n/a	n/a
3-Nitroaniline	Total	n/a	n/a
4-Bromophenyl Phenyl Ether	Total	n/a	n/a
4-Chloroaniline	Total	n/a	n/a
4-Chlorophenyl Phenyl Ether	Total	n/a	n/a
4-Methylphenol (p-Cresol)	Total	n/a	n/a
4-Nitroaniline	Total	n/a	n/a
4-Nitrophenol	Total	n/a	n/a
Acenaphthene	Total	1200	n/a
Acenaphthylene	Total	n/a	**
Aniline	Total	n/a	n/a
Anthracene	Total	9600	**
Benzidine	Total	0.00012	0.000069
Benzo(a)anthracene	Total	0.0044	n/a
Benzo(a)pyrene	Total	0.0044	n/a
Benzo(b)fluoranthene	Total	0.0044	n/a
Benzo(ghi)Perylene	Total	n/a	n/a
Benzo(k)fluoranthene	Total	0.0044	**
Benzoic acid	Total	n/a	n/a
Benzyl alcohol	Total	n/a	n/a
Bis(2-Chloroethoxy)Methane	Total	n/a	4.4
Bis(2-Chloroethyl)Ether	Total	0.031	0.045
Bis(2-Chloroisopropyl)Ether	Total	1400	1200
Bis(2-Ethylhexyl)Phthalate	Total	1.8	3.5
Butylbenzyl Phthalate	Total	n/a	n/a
Carbazole	Total	n/a	n/a

Table B-2. California Toxics Rule and Ocean Plan Water Quality Objectives for Potential Constituents in Caltrans Monitoring Projects (continued).

	<i>Fraction</i>	<i>CTR (µg/L)</i>	<i>Ocean Plan (µg/L)</i>
<i>Constituent</i>			
Semi-volatile and non-volatile organic compounds (continued)			
Chrysene	Total	0.0044	**
Dibenzofuran	Total	n/a	n/a
Diethyl Phthalate	Total	23000	33000
Dimethyl Phthalate	Total	313000	820000
Di-n-Butyl Phthalate	Total	2700	3500
Di-n-Octyl Phthalate	Total	n/a	n/a
Fluoranthene	Total	300	15
Fluorene	Total	1300	0.009
Hexachlorobenzene	Total	0.00075	0.00021
Hexachlorobutadiene	Total	0.44	14
Hexachlorocyclopentadiene	Total	240	58
Hexachloroethane	Total	1.9	2.5
Indeno(1,2,3-c,d)Pyrene	Total	0.0044	**
Isophorone	Total	8.4	150000
Naphthalene	Total	n/a	n/a
Nitrobenzene	Total	17	4.9
N-Nitrosodimethylamine	Total	0.00069	7.3
N-Nitrosodi-n-Propylamine	Total	0.005	n/a
N-Nitrosodiphenylamine	Total	5	2.5
PAHs ⁽⁷⁾		n/a	**
Pentachlorophenol	Total	0.28	n/a
Phenanthrene	Total	n/a	**
Phenol	Total	21000	n/a
Phenolics	Total	n/a	n/a
Pyrene	Total	960	**
Volatile organic compounds			
1,1,1-Trichloroethane	Total	n/a	540000
1,1,1,2-Tetrachloroethane	Total	0.17	1200
1,1,2-Trichloroethane	Total	0.6	43000
1,1-Dichloroethane	Total	n/a	n/a
1,1-Dichloroethylene	Total	0.057	7100
1,2-Dichlorobenzene	Total	2700	5100 ⁽⁴⁾
1,2-Dichloroethane	Total	0.38	130
1,2-Dichloropropane	Total	0.52	n/a
1,2-Trans-Dichloroethylene	Total	700	n/a
1,3-Dichlorobenzene	Total	400	5100 ⁽⁴⁾
1,4-Dichlorobenzene	Total	400	18
2-Butanone (Methylethyl ketone)	Total	n/a	n/a
2-Chloroethylvinyl ether	Total	n/a	n/a
2-Hexanone	Total	n/a	n/a
4-Methyl-2-Pentanone (MIBK)	Total	n/a	n/a
Acetone	Total	n/a	n/a
Acrolein	Total	320	220
Acrylonitrile	Total	0.059	0.1
Benzene	Total	1.2	5.9

Table B-2. California Toxics Rule and Ocean Plan Water Quality Objectives for Potential Constituents in Caltrans Monitoring Projects (continued).

	<i>Fraction</i>	<i>CTR</i> (µg/L)	<i>Ocean Plan</i> (µg/L)
Constituent			
Volatile organic compounds (continued)			
Bromoform	Total	4.3	n/a
Carbon Tetrachloride	Total	0.25	0.9
Chlorobenzene	Total	680	570
Chlorodibromomethane	Total	0.41	n/a
Chloroethane	Total	n/a	n/a
Chloroform	Total	5.7	130
cis-1,2-Dichloroethene	Total	n/a	n/a
cis-1,3-Dichloropropene	Total	n/a	n/a
Ethylbenzene	Total	3100	4100
M,P-XYLENES	Total	n/a	n/a
Methyl Bromide	Total	48	n/a
Methyl Chloride	Total	n/a	n/a
Methylene Chloride	Total	4.7	n/a
Methyl-t-butyl ether (MTBE)	Total	n/a	n/a
o-Xylene	Total	n/a	n/a
Styrene	Total	n/a	n/a
Tetrachloroethylene	Total	0.8	99
Toluene	Total	6800	85000
trans-1,3-Dichloropropene	Total	n/a	n/a
Trichloroethylene (TCE)	Total	2.7	27
Trichlorofluoromethane	Total	n/a	n/a
Vinyl Acetate	Total	n/a	n/a
Vinyl Chloride	Total	2	36
Xylenes (total)	Total	n/a	n/a
Other			
Chlorine residual	Total	n/a	60 ⁽¹⁾
Oil & Grease	Total	n/a	75000

¹ Water quality objectives with this footnote are "Instantaneous Maximum" values for the protection of marine aquatic life; all other values are 30-day average criteria for the protection of human health.

^{1a} Metals objectives are a function of hardness. The objectives are derived from a formula described in the California Toxics Rule (Federal Register, vol. 62, no. 150, Aug. 5, 1997, pg. 42206, paragraph (b)(2)).

² In the Ocean Plan, "DDT" refers to the sum of 4,4'-DDT, 2,4'-DDT, 4,4'-DDE, 2,4'-DDE, 4,4'-DDD, 2,4'-DDD.

³ "Endosulfan" refers to the sum of endosulfan-alpha, -beta, and -sulfate.

⁴ "Dichlorobenzenes" refers to the sum of 1,2- and 1,3-dichlorobenzene.

⁵ "Halomethanes" refers to the sum of bromoform, methyl bromide, methyl chloride, chlorodibromomethane and dichlorobromomethane.

⁶ "Heptachlor" refers to the sum of heptachlor and heptachlor epoxide.

⁷ "PAHs" refers to the sum of acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo[k]fluoranthene, 1,12-benzoperylene, benzo[a]prene, chrysene, dibenzo[ah]anthracene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene and pyrene.

* no individual limits set for Arachlors, see PCBs (total)

** no individual limits set for these compounds, see PAHs

n/a = not available