ENCLOSURE 4

Aquatic Life Criteria
in Effect for
Clean Water Act Purposes

TABLE 20

AQUATIC LIFE WATER QUALITY CRITERIA SUMMARY[1]

The concentration for each compound listed in this chart is a criteria or guidance value* not to be exceeded in waters of the state for the protection of aquatic life and human health. Specific descriptions of each compound and an explanation of values are included in Quality Criteria for Water (1986). Selecting values for regulatory purposes will depend on the most sensitive beneficial use to be protected, and what level of protection is necessary for aquatic life and human health.

Compound Name (or Class)	Priority Pollutant	Concentration in Micrograms Per Liter for Protection of Aquatic Life			
		Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria
ACENAPTHENE	Y				
ACROLEIN	Y				
ACRYLONITRILE	Y				
ALDRIN	Y	3		1.3	
ALKALINITY	N				
AMMONIA	N	CRITERIA ARE pH AND TEMPERATURE DEPENDENT—SEE DOCUMENT USEPA JANUARY 1985 (Fresh Water)			
ANTIMONY	Y				
ARSENIC	Y				
ARSENIC (PENT)	Y				
ARSENIC (TRI)	Y	360	190	69	36
ASBESTOS	Y				
BARIUM	N				
BENZENE	Y				
BENZIDINE	Y				
BERYLLIUM	Y				
BHC	Y				
CADMIUM	Y	3.9+			
CARBON TETRACHLORIDE	Y				
CHLORDANE	Y	2.4	0.0043	0.09	0.004
CHLORIDE	N				
CHLORINATED BENZENES	Y				
CHLORINATED NAPHTHALENES	Y				

Compound Name (or Class)	Priority Pollutant	Concentration in Micrograms Per Liter for Protection of Aquatic Life			
		Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria
CHLORINE	N				
CHLOROALKYL ETHERS	Y				
CHLOROETHYL ETHER (BIS-2)	Y				
CHLOROFORM	Y				
CHLOROISOPROPYL ETHER (BIS-2)	Y				
CHLOROMETHYL ETHER (BIS)	N				
CHLOROPHENOL 2	Y				
CHLOROPHENOL 4	N				
CHLOROPHENOXY HERBICIDES (2,4,5,-TP)	N				
CHLOROPHENOXY HERBICIDES (2,4-D)	N				
CHLORPYRIFOS	N				
CHLORO-4 METHYL-3 PHENOL	N				
CHROMIUM (HEX)	Y			1,100	50
CHROMIUM (TRI)	N				
COPPER	Y	18.+	12.+		
CYANIDE	Y				
DDT	Y	1.1	0.001	0.13	0.001
(TDE) DDT METABOLITE	Y				
(DDE) DDT METABOLITE	Y				
DEMETON	Y				
DIBUTYLPHTHALATE	Y				
DICHLOROBENZENES	Y				
DICHLOROBENZIDINE	Y				
DICHLOROETHANE 1,2	Y				
DICHLOROETHYLENES	Y				
DICHLOROPHENOL 2,4	N				
DICHLOROPROPANE	Y				
DICHLOROPROPENE	Y				
DIELDRIN	Y			0.71	0.0019
DIETHYLPHTHALATE	Y				
DIMETHYL PHENOL 2,4	Y				
DIMETHYL PHTHALATE	Y				

Compound Name (or Class)	Priority Pollutant	Concentration in Micrograms Per Liter for Protection of Aquatic Life			
		Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria
DINITROTOLUENE 2,4	N				
DINITROTOLUENE	Y				
DINITROTOLUENE	N				
DINITRO-O-CRESOL 2,4	Y				
DIOXIN (2,3,7,8-TCDD)	Y				
DIPHENYLHYDRAZINE	Y				
DIPHENYLHYDRAZINE 1,2	Y				
DI-2-ETHYLHEXYL PHTHALATE	Y				
ENDOSULFAN	Y	0.22	0.056	0.034	0.0087
ENDRIN	Y			0.037	0.0023
ETHYLBENZENE	Y				
FLUORANTHENE	Y				
GUTHION	N				
HALOETHERS	Y				
HALOMETHANES	Y				
HEPTACHLOR	Y	0.52	0.0038	0.053	0.0036
HEXACHLOROETHANE	N				
HEXACHLOROBENZENE	Y				
HEXACHLOROBUTADIENE	Y				
HEXACHLOROCYCLOHEXANE (LINDANE)	Y		0.08	0.16	
HEXACHLOROCYCLOHEXANE-ALPHA	Y				
HEXACHLOROCYCLOHEXANE-BETA	Y				
HEXACHLOROCYCLOHEXANE-GAMA	Y				
HEXACHLOROCYCLOHEXANE-TECHNICAL	Y				
HEXACHLOROCYCLOPENTADIENE	Y				
IRON	N				
ISOPHORONE	Y				
LEAD	Y				
MALATHION	N				
MANGANESE	N				
MERCURY	Y				

Compound Name (or Class)	Priority Pollutant	Concentration in Micrograms Per Liter for Protection of Aquatic Life			
		Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria
METHOXYCHLOR	N				
MIREX	N				
MONOCHLOROBENZENE	Y				
NAPHTHALENE	Y				
NICKEL	Y				
NITRATES	N				
NITROBENZENE	Y				
NITROPHENOLS	Y				
NITROSAMINES	Y				
NITROSODIBUTYLAMINE N	Y				
NITROSODIETHYLAMINE N	Y				
NITROSODIMETHYLAMINE N	Y				
NITROSODIPHENYLAMINE N	Y				
NITROSOPYRROLIDINE N	Y				
PARATHION	N				
PCB's	Y				
PENTACHLORINATED ETHANES	N				
PENTACHLOROBENZENE	N				
PENTACHLOROPHENOL	Y				
PHENOL	Y				
PHOSPHORUS ELEMENTAL	N				
PHTHALATE ESTERS	Y				
POLYNUCLEAR AROMATIC HYDROCARBONS	Y				
SELENIUM	Y	260	35		
SILVER	Y				
SULFIDE HYDROGEN SULFIDE	N				
TETRACHLORINATED ETHANES	Y				
TETRACHLOROBENZENE 1,2,4,5	Y				
TETRACHLOROETHANE 1,1,2,2	Y				
TETRACHLOROETHANES	Y				

Compound Name (or Class)	Priority Pollutant	Concentration in Micrograms Per Liter for Protection of Aquatic Life			
		Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria
TETRACHLOROETHYLENE	Y				
TETRACHLOROPHENOL 2,3,5,6	Y				
THALLIUM	Y				
TOLUENE	Y				
TOXAPHENE	Y				
TRICHLORINATED EtHANES	Y				
TRICHLOROETHANE 1,1,1	Y				
TRICHLOROETHANE 1,1,2	Y				
TRICHLOROETHYLENE	Y				
TRICHLOROPHENOL 2,4,5	N				
TRICHLOROPHENOL 2,4,6	Y				
VINYL CHLORIDE	Y				
ZINC	Y				

MEANING OF SYMBOLS:

g = grams
mg = milligrams
ug = micrograms
ng = nanograms
pg = picograms
Y = Yes
N = No

\+ = Hardness Dependent Criteria (100 mg/L used).
* = Insufficient data to develop criteria; value presented is the L.O.E.L – Lower Observed Effect Level.
*** = pH Dependent Criteria (7.8 pH used).
1 = Values in Table 20 are applicable to all basins.

Table 33A

Note: The environmental Quality Commission adopted the following criteria on May 20, 2004 to become effective February 15, 2005. However, EPA has not yet acted (as of June 2006) approved the criteria. Thus, Table 33A criteria may be used in NPDES permits, but not for the section 303(d) list of impaired waters.

AQUATIC LIFE WATER QUALITY CRITERIA SUMMARY[A]

The concentration for each compound listed in Table 33A is a criterion not to be exceeded in waters of the state in order to protect aquatic life. All values are expressed as micrograms per liter (µ/L) except where noted. Compounds are listed in alphabetical order with the corresponding EPA number (from National Recommended Water Quality Criteria:2002, EPA 8220R-02-047), the Chemical Abstract Service (CAS) number, aquatic life freshwater acute and chronic criteria, aquatic life saltwater acute and chronic criteria. The acute criteria refer to the average concentration for one (1) hour and the chronic criteria refer to the average concentration for 96 hours (4-days), and that these criteria should not be exceeded more than once every three (3) years.

			Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
56	Acenaphthene	83329								
57	Acenaphthylene	208968								
17	Acrolein	107028								
18	Acrylonitrile	107131								
102	Aldrin	309002								
1 N	Alkalinity				20,000 P					
2 N	Aluminum (pH 6.5 - 9.0)	7429905								
3 N	Ammonia	7664417					D	X	D	X
58	Anthracene	120127								
1	Antimony	7440360								
2	Arsenic	7440382								
15	Asbestos	1332214								
6 N	Barium	7440393								

			Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
19	Benzene	71432								
59	Benzidine	92875								
60	Benzo(a)Anthracene	56553								
61	Benzo(a)Pyrene	50328								
62	Benzo(b)Fluoranthene	205992								
63	Benzo(g,h,i)Perylene	191242								
64	Benzo(k)Fluoranthene	207089								
3	Beryllium	7440417								
103	BHC alpha-	319846								
104	BHC beta-	319857								
106	BHC delta-	319868								
105	BHC gamma- (Lindane)	58899	0.95							
7 N	Boron	7440428								
20	Bromoform	75252								
69	Bromophenyl Phenyl Ether 4-									
70	Butylbenzyl Phthalate	85687								
4	Cadmium	7440439								
21	Carbon Tetrachloride	56235								
107	Chlordane	57749								
8 N	Chloride	16887006	860000		230000					
9 N	Chlorine	7782505	19	X	11	X	13	X	7.5	X
22	Chlorobenzene	108907								
23	Chlorodibromomethane	124481								
24	Chloroethane	75003								
65	ChloroethoxyMethane Bis2-	111911								
66	ChloroethylEther Bis2-	111444								
25	Chloroethylvinyl Ether 2-	110758								
26	Chloroform	67663								
67	ChloroisopropylEther Bis2-	108601								
15 N	ChloromethylEther, Bis	542881								

			Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
71	Chloronaphthalene 2-	91587								
45	Chlorophenol 2-	95578								
10 N	Chlorophenoxy Herbicide (2,4,5,-TP)	93721								
11 N	Chlorophenoxy Herbicide (2,4-D)	94757								
72	Chlorophenyl Phenyl Ether 4-	7005723								
12 N	Chloropyrifos	2921882	0.083	X	0.041	X	0.011	X	0.0056	X
5a	Chromium (III)									
5b	Chromium (VI)	18540299								
73	Chrysene	218019								
6	Copper	7440508								
14	Cyanide	57125	22 S	X	5.2 S	X	1 S	X	1 S	X
108	DDT 4,4'-	50293								
109	DDE 4,4'-	72559								
110	DDD 4,4'-	72548								
14 N	Demeton	8065483			0.1	X			0.1	X
74	Dibenzo(a,h)Anthracene	53703								
75	Dichlorobenzene 1,2-	95501								
76	Dichlorobenzene 1,3-	541731								
77	Dichlorobenzene 1,4-	106467								
78	Dichlorobenzidine 3,3'-	91941								
27	Dichlorobromomethane	75274								
28	Dichloroethane 1,1-	75343								
29	Dichloroethane 1,2-	107062								
30	Dichloroethylene 1,1-	75354								
46	Dichlorophenol 2,4-	120832								
31	Dichloropropane 1,2-	78875								
32	Dichloropropene 1,3-	542756								
111	Dieldrin	60571	0.24							

			Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
79	DiethylPhthalate	84662								
47	Dimethylphenol 2,4-	105679								
80	DimethylPhthalate	131113								
81	Di-n-Butyl Phthalate	84742								
49	Dinitrophenol 2,4-	51285								
27 N	Dinitrophenols	25550587								
82	Dinitrotoluene 2,4-	121142								
83	Dinitrotoluene 2,6-	606202								
84	Di-n-Octyl Phthalate	117840								
16	Dioxin (2,3,7,8-TCDD)	1746016								
85	Diphenylhydrazine 1,2-	122667								
68	EthylhexylPhthalate Bis2-	117817								
	Endosulfan									
112	Endosulfan alpha-	959988								
113	Endosulfan beta-	33213659								
114	Endosulfan Sulfate	1031078								
115	Endrin	72208	0.086							
116	Endrin Aldehyde	7421934								
33	Ethylbenzene	100414								
86	Fluoranthene	206440								
87	Fluorene	86737								
17 N	Guthion	86500			0.01	X			0.01	X
117	Heptachlor	76448								
118	Heptachlor Epoxide	1024573								
88	Hexachlorobenzene	118741								
89	Hexachlorobutadiene	87683								
91	Hexachloroethane	67721								
19 N	Hexachlorocyclo-hexane-Technical	319868								
90	Hexachlorocyclopentadiene	77474								

			Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
92	Ideno1,2,3-(cd)Pyrene	193395								
20 N	Iron	7439896			1,000	X				
93	Isophorone	78591								
7	Lead	7439921								
21 N	Malathion	121755			0.1	X			0.1	X
22 N	Manganese	7439965								
8a	Mercury	7439976	2.4	X	0.012	X	2.1	X	0.025	X
23 N	Methoxychlor	72435			0.03	X			0.03	X
34	Methyl Bromide	74839								
35	Methyl Chloride	74873								
48	Methyl-4,6-Dinitrophenol 2-	534521								
52	Methyl-4-Chlorophenol 3-	59507								
36	Methylene Chloride	75092								
8b	Methylmercury	22967926								
24 N	Mirex	2385855			0.001	X			0.001	X
94	Naphthalene	91203								
9	Nickel	7440020								
25 N	Nitrates	14797558								
95	Nitrobenzene	98953								
50	Nitrophenol 2-	88755								
51	Nitrophenol 4-	100027								
26 N	Nitrosamines	35576911								
28 N	Nitrosodibutylamine,N	924163								
29 N	Nitrosodiethylamine,N	55185								
96	N-Nitrosodimethylamine	62759								
98	N-Nitrosodiphenylamine	86306								
30 N	Nitrosopyrrolidine,N	930552								
97	N-Nitrosodi-n-Propylamine	621647								
32 N	Oxygen, Dissolved	7782447								
33 N	Parathion	56382	0.065	X	0.013	X				

			Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
119	Polychlorinated Biphenyls PCBs:	1336363	2 U	X	0.014 U	X	10 U	X	0.03 U	X
34 N	Pentachlorobenzene	608935								
53	Pentachlorophenol	87865	M				13		7.9	
99	Phenanthrene	85018								
54	Phenol	108952								
36 N	Phosphorus Elemental	7723140							0.1	
100	Pyrene	129000								
10	Selenium	7782492								
11	Silver	7440224								
40 N	Sulfide-Hydrogen Sulfide	7783064			2	X			2	X
43 N	Tetrachlorobenzene,1,2,4,5	95943								
37	Tetrachloroethane 1,1,2,2-	79345								
38	Tetrachloroethylene	127184								
12	Thallium	7440280								
39	Toluene	108883								
120	Toxaphene	8001352	0.73	X	0.0002	X	0.21	X	0.0002	X
40	Trans-Dichloroethylene 1,2-	156605								
44 N	Tributyltin (TBT)	688733								
101	Trichlorobenzene 1,2,4-	120821								
41	Trichloroethane 1,1,1-	71556								
42	Trichloroethane 1,1,2-	79005								
43	Trichloroethylene	79016								
45 N	Trichlorophenol 2,4,5	95954								
55	Trichlorophenol 2,4,6-	88062								
44	Vinyl Chloride	75014								
13	Zinc	7440666								

Footnotes for Table 33A and 33B

D Ammonia criteria for saltwater may depend on pH and temperature. Values for saltwater criteria (total ammonia) can be calculated from the tables specified in *Ambient Water Quality Criteria for Ammonia (Saltwater)--1989* (EPA 440/5-88-004;

M Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC=(exp(1.005(pH)-4.869); CCC=exp(1.005(pH)-5.134).

N This number was assigned to the list of non-priority pollutants in National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047).

P Criterion shown is the minimum (i.e. CCC in water should not be below this value in order to protect aquatic life).

S This criterion is expressed as µg free cyanide (CN)/L.

U This criterion applies to total PCBs (e.g. the sum of all congener or all isomer or homolog or Arochlor analyses).

X The effective date for the criterion in the column immediately to the left is 1991.

Table 33B

Note: The environmental Quality Commission adopted the following criteria on May 20, 2004 to become effective on EPA approval. EPA has not yet (as of June 2006) approved the criteria. The Table 33B criteria may not be used until they are approved by EPA.

AQUATIC LIFE WATER QUALITY CRITERIA SUMMARY[A]

The concentration for each compound listed in Table 33A is a criterion not to be exceeded in waters of the state in order to protect aquatic life. All values are expressed as micrograms per liter (µ/L) except where noted. Compounds are listed in alphabetical order with the corresponding EPA number (from National Recommended Water Quality Criteria: 2002, EPA 8220R-02-047), the Chemical Abstract Service (CAS) number, aquatic life freshwater acute and chronic criteria, aquatic life saltwater acute and chronic criteria. The acute criteria refer to the average concentration for one (1) hour and the chronic criteria refer to the average concentration for 96 hours (4-days), and that these criteria should not be exceeded more than once every three (3) years.

					Freshwater				Saltwater			
					Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
2 N	Aluminum (pH 6.5 - 9.0)			7429905								
3 N	Ammonia			7664417								
2	Arsenic			7440382								
15	Asbestos			1332214								
19	Benzene			71432								
3	Beryllium			7440417								
105	BHC gamma- (Lindane)			58899								
4	Cadmium			7440439			E, F		40 E		8.8 E	
107	Chlordane			57749								
	CHLORINATED BENZENES											
26	Chloroform			67663								
67	ChloroisopropylEther Bis2-			108601								
15 N	ChloromethylEther, Bis			542881								
5a	Chromium (III)				E,F		E,F					
5b	Chromium (VI)			18540299	16 E		11 E					
6	Copper			7440508					4.8 E		3.1 E	

					Freshwater				Saltwater			
					Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
108	DDT 4,4'-			50293								
	DIBUTYLPHTHALATE											
	DICHLOROBENZENES											
	DICHLOROBENZIDINE											
	DICHLOROETHYLENES											
	DICHLOROPROPENE											
111	Dieldrin			60571			0.056					
	DINITROTOLUENE											
	DIPHENYLHYDRAZINE											
115	Endrin			72208			0.036					
86	Fluoranthene			206440								
	HALOMETHANES											
20 N	Iron			7439896								
7	Lead			7439921	E,F		E,F		210 E		8.1 E	
22 N	Manganese			7439965								
8a	Mercury			7439976								
	MONOCHLOROBENZENE											
9	Nickel			7440020	E,F		E,F		74 E		8.2 E	
53	Pentachlorophenol			87865			M					
54	Phenol			108952								
	POLYNUCLEAR AROMATIC HYRDOCARBONS											
10	Selenium			7782492					290 E		71 E	
11	Silver			7440224	E,F		0.10 E		1.9 E			
44 N	Tributyltin (TBT)			688733	0.46		0.063		0.37		0.01	
41	Trichloroethane 1,1,1-			71556								
55	Trichlorophenol 2,4,6-			88062								
13	Zinc			7440666	E,F		E,F		90 E		81 E	

Footnotes for Table 33A and 33B

E Freshwater and saltwater criteria for metals are expressed in terms of "dissolved" concentrations in the water column, except where otherwise noted (e.g. aluminum).

F The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. Criteria values for hardness may be calculated from the following formulae (CMC refers to Acute Criteria; CCC refers to Chronic Criteria):

$$CMC = (\exp(m_A*[\ln(\text{hardness})] + b_A))*CF$$
$$CCC = (\exp(m_C*[\ln(\text{hardness})] + b_C))*CF$$

where CF is the conversion factor used for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Chemical	m_A	b_A	m_C	b_C
Cadmium	---	---	0.7409	-4.719
Chromium III	0.8190	3.7256	0.8190	0.6848
Copper	---	---	---	---
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.59		
Zinc	0.8473	0.884	0.8473	0.884

Conversion factors (CF) for dissolved metals (the values for total recoverable metals criteria were multiplied by the appropriate conversion factors shown below to calculate the dissolved metals criteria):

Chemical	Freshwater		Saltwater	
	Acute	Chronic	Acute	Chronic
Arsenic	---	---	---	---
Cadmium	---	1.101672-[(ln hardness)(0.041838)]	0.994	0.994
Chromium III	0.316	0.860	--	--
Chromium VI	0.982	0.962	---	---
Copper	---	---	0.83	0.83
Lead	1.46203-[(ln hardness)(0.145712)]	1.46203-[(ln hardness)(0.145712)]	0.951	0.951
Nickel	0.998	0.997	0.990	0.990
Selenium	---	---	0.998	0.998
Silver	0.85	0.85	0.85	---
Zinc	0.978	0.986	0.946	0.946

M Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC=(exp(1.005(pH)-4.869); CCC=exp(1.005(pH)-5.134).

N This number was assigned to the list of non-priority pollutants in National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047).