TABLE 30: Aquatic Life Water Quality Criteria for Toxic Pollutants

Effective [EPA Approval XXXXXX]

Aquatic Life Criteria Summary

The concentration for each compound listed in Table 30 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 (µg/L). Compounds are listed in alphabetical order with the corresponding information: the Chemical Abstract Service (CAS) number, whether there is a human health criterion for the pollutant (i.e. "y"= yes, "n" = no), and the associated aquatic life freshwater and saltwater acute and chronic criteria. Italicized pollutants are not identified as priority pollutants by EPA.

Unless otherwise noted in the table below, the acute criterion is the Criterion Maximum Concentration (CMC) applied as a one hour average concentration, and the chronic criterion is the Criterion Continuous Concentration (CCC) applied as a 96 hour (4 days) average concentration. The CMC and CCC criteria should not be exceeded more than once every three years. Footnote A, associated with eleven pesticide pollutants in Table 30, describes the exception to the frequency and duration of the toxics criteria stated in this paragraph.

	Pollutant	CAS No.	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
1	Aldrin	309002	y	3 [A]	--	1.3 [A]	--
[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
2	*Alkalinity*		n	--	20,000 [B]	--	--
[B] *Criterion shown is the minimum (i.e. CCC in water may not be below this value in order to protect aquatic life).*							
3	*Ammonia*	7664417	n	*Criteria are pH, temperature, and life stage dependent-- See document USEPA January 1985 (Fresh Water).* [M]		*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; http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm*	
[M] See expanded footnote M equations at bottom of Table 30 to calculate freshwater ammonia criteria							
4	Arsenic		y	340 [C, D]	150 [C, D]	69 [C, D]	36 [C, D]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*							

	Pollutant	CAS No.	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
	[D] *Criterion is applied as total arsenic (i.e. arsenic (III) + arsenic (V)).*						
5	BHC Gamma (Lindane)	58899	y	0.95	0.08 [A]	0.16 [A]	
	[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
6	Cadmium	7440439	n	3.9 [E]	*See* **C, F**	40 [C]	8.8 [C]
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [E] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 100 mg/L. To calculate the criterion based on other hardness values, use formula under expanded Footnote E at bottom of Table 30.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.*						
7	Chlordane	57749	y	2.4 [A]	0.0043 [A]	0.09 [A]	0.004 [A]
	[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
8	*Chloride*	16887006	n	860,000	230,000	--	--
9	*Chlorine*	7782505	n	19	11	13	7.5
10	*Chlorpyrifos*	2921882	n	0.083	0.041	0.011	0.0056
11	Chromium VI	18540299	n	16 [C]	11 [C]	1100 [C]	50 [C]
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*						
12	Chromium III	16065831	n	*See* **C, F**	*See* **C, F**	--	--
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.*						
13	Copper	7440508	y	18 [E]	12 [E]	4.8 [C]	3.1 [C]
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [E] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 100 mg/L. To calculate the criterion based on other hardness values, use formula under expanded Footnote E at bottom of Table 30.*						
14	Cyanide	57125	y	22 [J]	5.2 [J]	1 [J]	1 [J]
	[J] This criterion is expressed as µg free cyanide (CN)/L.						
15	DDT 4,4'	50293	y	1.1 [A, G]	0.001 [A, G]	0.13 [A, G]	0.001 [A, G]
	[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
16	*Demeton*	8065483	n	--	0.1	--	0.1
17	Dieldrin	60571	y	0.24	0.056	0.71 [A]	0.0019 [A]
	[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
18	Endosulfan	115297	n	0.22 [A, H]	0.056 [A, H]	0.034 [A, H]	0.0087 [A, H]
	[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
19	Endosulfan Alpha	959988	y	0.22 [A]	0.056 [A]	0.034 [A]	0.0087 [A]
	[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
20	Endosulfan Beta	33213659	y	0.22 [A]	0.056 [A]	0.034 [A]	0.0087 [A]
	[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
21	Endrin	72208	y	0.086	0.036	0.037 [A]	0.0023 [A]

	Pollutant	CAS No.	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
22	*Guthion*	86500	n	--	0.01	--	0.01
23	Heptachlor	76448	y	0.52 [A]	0.0038 [A]	0.053 [A]	0.0036 [A]
[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
24	Heptachlor Epoxide	1024573	y	0.52 [A]	0.0038 [A]	0.053 [A]	0.0036 [A]
[A] *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
25	*Iron (total)*	7439896	n	--	1000	--	--
26	Lead	7439921	n	*See* **C , F**	*See* **C , F**	210 [C]	8.1 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.*							
27	*Malathion*	121755	n	--	0.1	--	0.1
28	Mercury (total)	7439976	n	2.4	0.012	2.1	0.025
29	*Methoxychlor*	72435	y	--	0.03	--	0.03
30	*Mirex*	2385855	n	--	0.001	--	0.001
31	Nickel	7440020	y	*See* **C , F**	*See* **C , F**	74 [C]	8.2 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.*							
32	*Parathion*	56382	n	0.065	0.013	--	--
33	Pentachlorophenol	87865	y	*See* **H**	*See* **H**	13	7.9
[H] *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).*							
34	*Phosphorus Elemental*	7723140	n	--	--	--	0.1
35	Polychlorinated Biphenyls (PCBs)	NA	y	2 [K]	0.014 [K]	10 [K]	0.03 [K]
[K] *This criterion applies to total PCBs (e.g.* determined as Aroclors or congeners)							
36	Selenium	7782492	y	*See* **C , L**	4.6 [C]	290 [C]	71 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [L] *The CMC = (1/[(f1/CMC1)+(f2/CMC2)]µg/L)*CF where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 µg/L and 12.82 µg/L, respectively. See expanded footnote F for the Conversion Factor (CF) for selenium.*							
37	Silver	7440224	n	*See* **C , F**	0.10 [C]	1.9 [C]	--
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater acute criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.*							
38	*Sulfide Hydrogen Sulfide*	7783064	n	--	2	--	2
39	Toxaphene	8001352	y	0.73	0.0002	0.21	0.0002
40	*Tributyltin (TBT)*	688733	n	0.46	0.063	0.37	0.01

	Pollutant	CAS No.	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
41	Zinc	7440666	y	*See* **C , F**	*See* **C , F**	90 [C]	81 [C]

[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*

[F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.*

Expanded Footnotes A, E, F, M

Footnote A: Alternate Frequency and Duration for Certain Pesticides

This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines for minimum data requirements and derivation procedures. The CMC should not be exceeded at any time and the CCC should not be exceeded based on a 24-hour average. The CMC may be applied using a one hour averaging period not to be exceeded more than once every three years, if the CMC values given in Table 30 are divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Footnote E: Equations for Hardness-Dependent Freshwater Metals Criteria for Cadmium Acute and Copper Acute and Chronic Criteria

The freshwater criteria for these metals are expressed as total recoverable and are a function of hardness (mg/L) in the water column. Criteria values for hardness may be calculated from the following formulas (CMC refers to the acute criterion; CCC refers to the chronic criterion):

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

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

Chemical	m_A	b_A	m_C	b_C
Cadmium	1.128	-3.828	N/A	N/A
Copper	0.9422	-1.464	0.8545	-1.465

Footnote F: Equations for Hardness-Dependent Freshwater Metals Criteria and Conversion Factor Table

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

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

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

"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	$\mathbf{m_A}$	$\mathbf{b_A}$	$\mathbf{m_C}$	$\mathbf{b_C}$
Cadmium	N/A	N/A	0.7409	-4.719
Chromium III	0.8190	3.7256	0.8190	0.6848
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

The conversion factors (CF) below must be used in the equations above for the hardness-dependent metals in order to convert total recoverable metals criteria to dissolved metals criteria. For metals that are not hardness-dependent (i.e. arsenic, chromium VI, selenium, and silver (chronic)), or are saltwater metals criteria, the criterion value associated with the metal in Table 30 reflects a dissolved criterion based on its conversion factor below. No further conversion is needed.

Conversion Factor (CF) Table for Dissolved Metals

Chemical	Freshwater		Saltwater	
	Acute	Chronic	Acute	Chronic
Arsenic	1.000	1.000	1.000	1.000
Cadmium	N/A	1.101672-[(ln hardness)(0.041838)]	0.994	0.994
Chromium III	0.316	0.860	--	--
Chromium VI	0.982	0.962	0.993	0.993
Copper	N/A	N/A	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	0.996	0.922	0.998	0.998
Silver	0.85	0.85	0.85	--
Zinc	0.978	0.986	0.946	0.946

Footnote M: Equations for Freshwater Ammonia Calculations

Acute Criterion
The 1-hour average concentration of un-ionized ammonia (mg/L NH3) does not exceed more often than once every three years on average, the numerical value given by:

CMC_{NH3} = 0.52/FT/FPH/2 where:

$FT = 10^{0.03(20-TCAP)}$; $TCAP \leq T \leq 30$ C
$FT = 10^{0.03(20-T)}$; $0 \leq T \leq TCAP$

FPH = 1 $\quad 8 \leq pH \leq 9$
$FPH = \frac{1 + 10^{7.4-pH}}{1.25} \quad 6.5 \leq 8$

TCAP = 20 C; Salmonids and other sensitive coldwater species present
TCAP = 25 C; Salmonids and other sensitive coldwater species absent

Chronic Criterion

The 4-day average concentration of un-ionized ammonia (mg/L NH3) does not exceed more often than once every three years on average, the average numerical value given by:

CCC_{NH3} = 0.80/FT/FPH/RATIO

where FT and FPH are as above for acute criterion and:

RATIO = 16 $7.7 \leq pH \leq 9$
RATIO = 24 $6.5 \leq pH \leq 7.7$

TCAP = 15 C; Salmonids and other sensitive coldwater species present
TCAP = 20 C; Salmonids and other sensitive coldwater species absent