

This appendix contains three charts (priority pollutants, nonpriority pollutants, and organoleptic effects) of numeric criteria for the protection of human health and aquatic life. The appendix also contains four attachments which address hardness conversions and application of ammonia criteria. Footnotes specific to each chart follow the chart. General footnotes pertaining to all are at the end of the charts prior to the attachments. The numeric criteria developed and published by EPA are hereby incorporated into this regulation. Please refer to the text of the regulation for other general information and specifications in applying these numeric criteria.

PRIORITY TOXIC POLLUTANTS

Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source	
		CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:				
						Water & Organism (µg/L)	Organism Only (µg/L)	MCL (µg/L)		
1	Antimony	7440360				5.6 B, ee	640 B, ee	6 ee	65FR66443 SDWA	
2	Arsenic	7440382	340 A, D, K	150 A, D, K	69 A, D, Y	36 A, D, Y	10 C	10 C	10 C	65FR31682 57FR60848 SDWA
3	Beryllium	7440417				J, ee	J, ee	4 ee	65FR31682 SDWA	
4	Cadmium	7440439	0.49 D, E, Y	0.26 D, E, Y	33 D, Y	8.0 D, Y	J, ee	J, ee	5 ee	81FR19176 SDWA
5a	Chromium III	16065831	580 D, E, K	28 D, E, K			J, ee	J, ee	100 Total ee	EPA820/B-96-001 65FR31682 SDWA
5b	Chromium VI	18540299	16 D, K	11 D, K	1,100 D, Y	50 D, Y	J, ee	J, ee	100 Total ee	65FR31682 SDWA
6	Copper	7440508	3.8 D, E, K, Z, ll	2.9 D, E, K, Z, ll	5.8 D, Z, Y, cc	3.7 D, Z, Y, cc	1,300 T, ee			65FR31682
7	Lead	7439921	14 D, E, Y	0.54 D, E, Y	220 D, Y	8.5 D, Y				65FR31682

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		CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:				
						Water & Organism (µg/L)	Organism Only (µg/L)	MCL (µg/L)		
8	Mercury	7439976	1.6 D, K, dd	0.91 D, K, dd	2.1 D, bb, dd	1.1 D, bb, dd	0.050 B, ee	0.051 B, ee	2 ee	65FR31682 SDWA
9	Nickel	7440020	150 D, E, K	16 D, E, K	75 D, Y	8.3 D, Y	610 B, ee	4, 600 B, ee		65FR31682
10	Selenium	7782492		5.0 S	290 D, aa	71 D, aa	170 Z, ee	4,200 ee	50 ee	65FR31682 65FR66443 SDWA
11	Silver	7440224	0.37 D, E, G		2.3 D, G					65FR31682
12	Thallium	7440280					0.24	0.47	2 ee	68FR75510 SDWA
13	Zinc	7440666	37 D, E, K	37 D, E, K	95 D, Y	86 D, Y	7,400 T, ee	26,000 T, ee		65FR31682 65FR66443
14	Cyanide	57125	22 K, P	5.2 K, P	1 P, Y	1 P, Y	140 ee, jj	140 ee, jj	200 ee	EPA820/B-96-001 57FR60848 68FR75510 SDWA
15	Asbestos	1332214							7 million fibers/L I, ee	57FR60848
16	2, 3, 7, 8-TCDD (Dioxin)	1746016						0.046 ppq O, C	30ppq O, C	State Standard SDWA
17	Acrolein	107028	3	3			6 ee, nn	9 ee, nn		74FR27535 74FR46587
18	Acrylonitrile	107131					0.051 B, C	0.25 B, C		65FR66443
19	Benzene	71432					2.2 B, C	51 B, C	5 C	IRIS 01/19/00 65FR66443 SDWA

Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
		CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:			
						Water & Organism (µg/L)	Organism Only (µg/L)	MCL (µg/L)	
20	Bromate	15541454						10 C	SDWA
21	Bromoform	75252				4.3 B, C	140 B, C	80 Total THMs C	65FR66443 SDWA
22	Bromoacetic acid	79083						60 Total HAA5 C,mm	SDWA
23	Carbon Tetrachloride	56235				0.23 B, C	1.6 B, C	5 C	65FR66443 SDWA
24	Chlorite	67481						100	SDWA
25	Chlorobenzene	108907				130T, ee	1,600 T, ee	100 T, ee	68FR75510 SDWA
26	Chlorodibromomethane	124481				0.40 B, C	13 B, C	80 Total THMs C	65FR66443 SDWA
27	Chloroform	67663				5.7 B, C, hh	470 B, C, hh	80 Total THMs C	62FR42160 SDWA
28	Dibromoacetic acid	631641						60 Total HAA5 C, mm	SDWA
29	Dichloroacetic acid	79436						60 Total HAA5 C,mm	SDWA
30	Dichlorobromomethane	75274				0.55 B, C	17 B, C	80 Total THMs C	65FR66443 SDWA
31	1, 2-Dichloroethane	107062				0.38 B, C	37 B, C	5 C	65FR66443 SDWA
32	1, 1-Dichloroethylene	75354				330 ee	7,100 ee	7 C	68FR75510 SDWA

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			CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:			
						Water & Organism (µg/L)	Organism Only (µg/L)	MCL (µg/L)		
33	1, 2-Dichloropropane	78875				0.50 B, C	15 B, C	5 C	65FR66443 SDWA	
34	1, 3-Dichloropropene	542756				0.34 ee	21 ee		68FR75510	
35	Ethylbenzene	100414				530 ee	2,100 ee	700 ee	68FR75510 SDWA	
36	Methyl Bromide	74839				47 B, ee	1,500 B, ee		65FR66443	
37	Methylene Chloride	75092				4.6 B, C	590 B, C	5 C	65FR66443 SDWA	
38	Monochloroacetic acid	79118						60 Total HAA5 C,mm	SDWA	
39	1, 1, 2, 2-Tetrachloroethane	79345				0.17 B, C	4.0 B, C		65FR66443	
40	Tetrachloroethylene	127184				0.69 C	3.3 C	5 C	65FR66443 SDWA	
41	Toluene	108883				1,300 ee	15,000 ee	1000 ee	68FR75510 SDWA	
42	1,2-Trans- Dichloroethylene	156605				140 ee	10,000 ee	100 ee	68FR75510 SDWA	
43	Trichloroacetic acid	79039						60 Total HAA5 C,mm	SDWA	
44	1, 1, 1-Trichloroethane	71556				J, ee	J, ee	200 ee	65FR31682 SDWA	

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		CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:				
						Water & Organism (µg/L)	Organism Only (µg/L)	MCL (µg/L)		
57	Anthracene	120127				8,300 B, ee	40,000 B, ee		65FR66443	
58	Benzidine	92875				0.000086 B, C	0.00020 B, C		65FR66443	
59	Benzo (a) Anthracene	56553				0.0038 B, C	0.018 B, C		65FR66443	
60	Benzo (a) Pyrene	50328				0.0038 B, C	0.018 B, C	0.2 C	65FR66443 SDWA	
61	Benzo (b) Fluoranthene	205992				0.0038 B, C	0.018 B, C		65FR66443	
62	Benzo (k) Fluoranthene	207089				0.0038 B, C	0.018 B, C		65FR66443	
63	Bis-2-Chloroethyl Ether	111444				0.030 B, C	0.53 B, C		65FR66443	
64	Bis-2-Chloroisopropyl Ether	108601				1,400 B, ee	65,000 B, ee		65FR66443	
65	Bi-s2-Ethylhexyl Phthalate (DEHP)	117817	V	V	V	V	1.2 B, C	2.2 B, C	6 C	65FR66443 SDWA
66	Butylbenzene Phthalate	85687	ii	ii	ii	ii	1,500 B, ee	1,900 B, ee		65FR66443
67	2-Chloronaphthalene	91587					1,000 B, ee	1,600 B, ee		65FR66443
68	Chrysene	218019					0.0038 B, C	0.018 B, C		65FR66443

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						Water & Organism (µg/L)	Organism Only (µg/L)	MCL (µg/L)	
69	Dibenzo(a,h)Anthracene	53703				0.0038 B, C	0.018 B, C		65FR66443
70	1, 2-Dichlorobenzene	95501				420 ee	1,300 ee	600 ee	68FR75510 SDWA
71	1, 3-Dichlorobenzene	541731				320 ee	960 ee		65FR66443
72	1, 4-Dichlorobenzene	106467				63 ee	190 ee	75 ee	68FR75510 SDWA
73	3, 3'-Dichlorobenzidine	91941				0.021 B, C	0.028 B, C		65FR66443
74	Diethyl Phthalate	84662	ii	ii	ii	ii	17,000 B, ee	44,000 B, ee	65FR66443
75	Dimethyl Phthalate	131113	ii	ii	ii	ii	270,000 B, ee	1,100,000 B, ee	64FR66443
76	Di-n-butyl Phthalate	84742	ii	ii	ii	ii	2,000 B, ee	4,500 B, ee	65FR66443
77	2, 4-Dinitrotoluene	121142					0.11 C	3.4 C	65FR66443
78	1, 2-Diphenylhydrazine	122667					0.036 B, C	0.20 B, C	65FR66443
79	Fluoranthene	206440					130 B, ee	140 B, ee	65FR66443
80	Fluorene	86737					1,100 B, ee	5,300 B, ee	65FR66443

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						Water & Organism (µg/L)	Organism Only (µg/L)	MCL (µg/L)		
81	Hexachlorobenzene	118741				0.00028 B, C	0.00029 B, C	1 C	65FR66443 SDWA	
82	Hexachlorobutadiene	87683				0.44 B, C	18 B, C		65FR66443	
83	Hexachlorocyclopentadiene	77474				40 T, ee	1100 T, ee	50 ee	68FR75510 SDWA	
84	Hexachloroethane	67721				1.4 B, C	3.3 B, C		65FR66443	
85	Indeno 1,2,3(cd) Pyrene	193395				0.0038 B, C	0.018 B, C		65FR66443	
86	Isophorone	78591				35 B, C	960 B, C		65FR66443	
87	Nitrobenzene	98953				17 B, ee	690 B, H, T, ee		65FR66443	
88	N-Nitrosodimethylamine	62759				0.00069 B, C	3.0 B, C		65FR66443	
89	N-Nitrosodi-n-Propylamine	621647				0.0050 B, C	0.51 B, C		65FR66443	
90	N-Nitrosodiphenylamine	86306				3.3 B, C	6.0 B, C		65FR66443	
91	Pyrene	129000				830 B, ee	4,000 B, ee		65FR66443	
92	1, 2, 4-Trichlorobenzene	120821				35 ee	70 ee	70 ee	68FR75510 SDWA	

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						Water & Organism (µg/L)	Organism Only (µg/L)	MCL (µg/L)		
93	Aldrin	309002	3.0 G, X		1.3 G, X		0.000049 B, C	0.000050 B, C	65FR31682 65FR66443	
94	alpha-BHC	319846					0.0026 B, C	0.0049 B, C	65FR66443	
95	beta-BHC	319857					0.0091 B, C	0.017 B, C	65FR66443	
96	gamma-BHC (Lindane)	58899	0.95 K		0.16 G		0.98 ee	1.8 ee	0.2 C	65FR31682 68FR75510 SDWA
97	Chlordane	57749	2.4 G	0.0043 G, X	0.09 G	0.004 G, X	0.00080 B, C	0.00081 B, C	2 C	65FR31682 65FR66443 SDWA
98	4, 4'-DDT	50293	1.1 G, gg	0.001 G, X, gg	0.13 G, gg	0.001 G, X, gg	0.00022 B, C	0.00022 B, C		65FR31682 65FR66443
99	4, 4'-DDE	72559					0.00022 B, C	0.00022 B, C		65FR66443
100	4, 4'-DDD	72548					0.00031 B, C	0.00031 B, C		65FR66443
101	Dieldrin	60571	0.24 K	0.056 K, N	0.71 G	0.0019 G, X	0.000052 B, C	0.000054 B, C		65FR31682 65FR66443
102	alpha-Endosulfan	959988	0.22 G, W	0.056 G, W	0.034 G, W	0.0087 G, W	62 B, ee	89 B, ee		65FR31682 65FR66443
103	beta-Endosulfan	33213659	0.22 G, W	0.056 G, W	0.034 G, W	0.0087 G, W	62 B, ee	89 B, ee		65FR31682 65FR66443
104	Endosulfan Sulfate	1031078					62 B, ee	89 B, ee		65FR31682 65FR66443

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						Water & Organism (µg/L)	Organism Only (µg/L)	MCL (µg/L)		
105	Endrin	72208	0.086 K	0.036 K, N	0.037 G	0.0023 G, X	0.059 ee	0.060 ee	2 ee	68FR75510 SDWA
106	Endrin Aldehyde	7421934					0.29 B, ee	0.30 B, H, ee		65FR66443
107	Heptachlor	76448	0.52 G	0.0038 G, X	0.053 G	0.0036 G, X	0.000079 B, C	0.000079 B, C	0.4 C	65FR31682 65FR66443 SDWA
108	Heptachlor Epoxide	1024573	0.52 G, U	0.0038 G, U, X	0.053 G, U	0.0036 G, U, X	0.000039 B, C	0.000039B, C	0.2 C	65FR31682 65FR66443 SDWA
109	Polychlorinated Biphenyls PCBs	--		0.014 M, X		0.03 M, X	0.000064 B, C, M	0.000064 B, C, M	0.5 C	65FR31682 65FR66443 SDWA
110	Toxaphene	8001352	0.73	0.0002 X	0.21	0.0002 X	0.00028 B, C	0.00028 B, C	3 C	65FR31682 65FR66443 SDWA

Footnotes:

- A This water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. In the arsenic criteria document (EPA 440/5-84-033, January 1985), Species Mean Acute Values are given for both arsenic (III) and arsenic (V) for five species and the ratios of the SMAVs for each species range from 0.6 to 1.7. Chronic values are available for both arsenic (III) and arsenic (V) for one species; for the fathead minnow, the chronic value for arsenic (V) is 0.29 times the chronic value for arsenic (III). No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive.
- B This criterion has been revised to reflect The Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of May 17, 2002. The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case.
- C This criterion is based on carcinogenicity of 10⁻⁶ risk. As prescribed in Section E of this regulation, application of this criterion for permit effluent limitations requires the use annual average flow or comparable tidal condition as determined by the Department.
- D Freshwater and saltwater criteria for metals are expressed in terms of total recoverable metals. As allowed in Section E of this regulation, these criteria may be expressed as dissolved metal for the purposes of deriving permit effluent limitations. The dissolved metal water quality criteria value may be calculated by using these 304(a) aquatic life criteria expressed in terms of total recoverable metal, and multiplying it by a conversion factor (CF). The term "Conversion Factor" (CF) represents the conversion factor 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. (Conversion Factors for saltwater CCCs are not currently available. Conversion factors derived for saltwater CMCs have been used for both saltwater CMCs and CCCs). See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria", October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available from the Water Resource center, USEPA, 401 M St., SW, mail code RC4100, Washington, DC 20460; and 40CFR§131.36(b)(1). Conversion Factors can be found in Attachment 1 – Conversion Factors for Dissolved Metals.

- 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 25 mg/L as expressed as CaCO₃. Criteria values for other hardness may be calculated from the following: CMC (dissolved) = $\exp\{m_A [\ln(\text{hardness})] + b_A\}$ (CF), or CCC (dissolved) = $\exp\{m_C [\ln(\text{hardness})] + b_C\}$ (CF) and the parameters specified in Attachment 2 – Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness- Dependent. As noted in footnote D above, the values in this appendix are expressed as total recoverable, the criterion may be calculated from the following: CMC (total) = $\exp\{m_A [\ln(\text{hardness})] + b_A\}$, or CCC (total) = $\exp\{m_C [\ln(\text{hardness})] + b_C\}$.
- F Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC = $\exp(1.005(\text{pH}) - 4.869)$; CCC = $\exp(1.005(\text{pH}) - 5.134)$. Values displayed in table correspond to a pH of 7.8.
- G This criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endosulfan (EPA 440/5-80-046), Endrin (EPA 440/5-80-047), Heptachlor (440/5-80-052), Hexachlorocyclohexane (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a “CMC” derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.
- H No criterion for protection of human health from consumption of aquatic organisms excluding water was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, sufficient information was presented in the 1980 document to allow the calculation of a criterion, even though the results of such a calculation were not shown in the document.
- I This criterion for asbestos is the Maximum Contaminant Level (MCL) developed under the Safe Drinking Water Act (SDWA) and the National Primary Drinking Water Regulation (NPDWR).
- J EPA has not calculated a 304(a) human health criterion for this contaminant. The criterion is the Maximum Contaminant Level developed under the Safe Drinking Water Act (SDWA) and the National Primary Drinking Water Regulation (NPDWR).
- K This criterion is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water*, (EPA-820-B-96-001, September 1996). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the difference between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates. None of the decisions concerning the derivation of this criterion were affected by any considerations that are specific to the Great Lakes.
- L The CMC = $1/[(f_1/\text{CMC1}) + (f_2/\text{CMC2})]$ where f_1 and f_2 are the fractions of total selenium that are treated as selenite and selenite, respectively, and CMC1 and CMC2 are 185.9 µg/l and 12.82 µg/l, respectively.
- M This criterion applies to total PCBs, (e.g., the sum of all congener or all isomer or homolog or Aroclor analyses.)
- N The derivation of the CCC for this pollutant did not consider exposure through the diet, which is probably important for aquatic life occupying upper trophic levels.
- O This state criterion is also based on a total fish consumption rate of 0.0175 kg/day.
- P This water quality criterion is expressed as µg free cyanide (as CN)/L.
- Q This value was announced (61FR58444-58449, November 14, 1996) as a proposed GLI 303 I aquatic life criterion
- S This water quality criterion for selenium is expressed in terms of total recoverable metal in the water column. It is scientifically acceptable to use the conversion factor (0.996 – CMC or 0.922 – CCC) that was used in the GLI to convert this to a value that is expressed in terms of dissolved metal.
- T The organoleptic effect criterion is more stringent than the value for priority toxic pollutants.
- U This value was derived from data for heptachlor and the criteria document provides insufficient data to estimate the relative toxicities of heptachlor and heptachlor epoxide.
- V There is a full set of aquatic life toxicity data that show that DEHP is not toxic to aquatic organisms at or below its solubility limit.
- W This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.
- X This criterion is based on a 304(a) aquatic life criterion issued in 1980 or 1986, and was issued in one of the following documents: Aldrin/Dieldrin (EPA440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endrin (EPA 440/5-80-047), Heptachlor (EPA 440/5-80-052), Polychlorinated Biphenyls (EPA 440/5- 80-068), Toxaphene (EPA 440/5-86-006). This CCC is based on the Final Residue value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the EPA no longer uses the Final Residue value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.
- Y This water quality criterion is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in one of the following criteria documents: Arsenic (EPA 440/5-84-033), Cadmium (EPA-820-R-16-002), Chromium (EPA 440/5-84-029), Copper (EPA 440/5-84-031), Cyanide (EPA 440/5-84-028), Lead (EPA 440/5-84-027), Nickel (EPA 440/5-86-004), Pentachlorophenol (EPA 440/5-86-009), Toxaphene, (EPA 440/5-86-006), Zinc (EPA 440/5-87- 003).
- Z When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.

- aa The selenium criteria document (EPA 440/5-87-006, September 1987) provides that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the concentration of selenium exceeds 5.0 7g/L in salt water because the saltwater CCC does not take into account uptake via the food chain.
- bb This water quality criterion was derived on page 43 of the mercury criteria document (EPA 440/5-84-026, January 1985). The saltwater CCC of 0.025 µg/L given on page 23 of the criteria document is based on the Final Residue value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the EPA no longer uses the Final Residue value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.
- cc This water quality criterion was derived in *Ambient Water Quality Criteria Saltwater Copper Addendum* (Draft, April 14, 1995) and was promulgated in the Interim Final National Toxics Rule (60FR22228-222237, May 4, 1995).
- dd This water quality criterion was derived from data for inorganic mercury (II), but is applied here to total mercury. If a substantial portion of the mercury in the water column is methylmercury, this criterion will probably be under protective. In addition, even though inorganic mercury is converted to methylmercury and methylmercury bioaccumulates to a great extent, this criterion does not account for uptake via the food chain because sufficient data were not available when the criterion was derived.
- ee This criterion is a noncarcinogen. As prescribed in Section E of this regulation, application of this criterion for determining permit effluent limitations requires the use of 7Q10 or comparable tidal condition as determined by the Department.
- gg This criterion applies to DDT and its metabolites (i.e., the total concentration of DDT and its metabolites should not exceed this value).
- hh Although a new RfD is available in IRIS, the surface water criteria will not be revised until the National Primary Drinking Water Regulations: Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) is completed, since public comment on the relative source contribution (RSC) for chloroform is anticipated.
- ii Although EPA has not published a completed criteria document for phthalate, it is EPA's understanding that sufficient data exist to allow calculation of aquatic life criteria.
- jj This recommended water quality criterion is expressed as total cyanide, even though the IRIS RfD the EPA used to derive the criterion is based on free cyanide. The multiple forms of cyanide that are present in ambient water have significant differences in toxicity due to their abilities to liberate the CN-moiety. Some complex cyanides require even more extreme conditions than refluxing with sulfuric acid to liberate the CN-moiety. Thus, these complex cyanides are expected to have little or no 'bioavailability' to humans. If a substantial fraction of the cyanide present in a water body is present in a complexed form (e.g., $FE_4[FE(CN)_6]_3$), this criterion may be overly conservative.
- kk This recommended water quality criterion was derived using the cancer slope factor of 1.4 (Linear multi-stage model (LMS) exposure from birth).
- ll Freshwater copper criteria may be calculated utilizing the procedures identified in EPA-822-R-07-001.
- mm HAA5 means five haloacetic acids (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, bromoacetic acid and dibromoacetic acid).
- nn This criterion has been revised to reflect the EPA's cancer slope factor (CSF) or reference dose (RfD), as contained in the Integrated Risk Information System (IRIS) as of (Final FR Notice June 10, 2009). The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case.

NON PRIORITY POLLUTANTS

Non Priority Pollutant		CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source	
			CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:		MCL (µg/L)		
							Water & Organism (µg/L)	Organism Only (µg/L)			
1	Alachlor								2 M	SDWA	
2	Ammonia	7664417	CRITERIA ARE pH AND TEMPERATURE DEPENDENT – SEE DOCUMENT FOR DETAILS								EPA822-R99-014 EPA440/5-88-004
3	Aesthetic Qualities		NARRATIVE STATEMENT AND NUMERIC CRITERIA – SEE TEXT								Gold Book
4	Atrazine								3 M	SDWA	
5	Bacteria		FOR PRIMARY CONTACT RECREATION AND SHELLFISH USES – SEE TEXT								Gold Book
6	Barium	7440393					1,000 A, L		2,000 L	Gold Book	
7	Carbofuran	1563662							40 L	SDWA	
8	Chlorine	7782505	19	11	13	7.5			G	Gold Book SDWA	
9	Chlorophenoxy Herbicide 2, 4, 5, -TP	93721					10 A, L		50 L	Gold Book SDWA	
10	Chlorophenoxy Herbicide 2, 4-D	94757					100 A, L		70 L	Gold Book SDWA	
11	Chlorophyll <i>a</i>		NARRATIVE STATEMENT AND NUMERIC CRITERIA – SEE TEXT								State Standard
12	Chloropyrifos	2921882	0.083 F	0.041 F	0.011 F	0.0056 F				Gold Book	
13	Color		NARRATIVE STATEMENT – SEE TEXT								State Standard

Non Priority Pollutant		CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
			CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:		MCL (µg/L)	
							Water & Organism (µg/L)	Organism Only (µg/L)		
14	Dalapon	75990							200 L	SDWA
15	Demeton	8065483		0.1 E		0.1 E				Gold Book
16	1,2-Dibromo-3-chloropropane (DBCP)	96128							0.2 M	SDWA
17	Di(2-ethylhexyl) adipate	103231							400 L	SDWA
18	Dinoseb	88857							7 L	SDWA
19	Dinitrophenols	25550587					69 L	5,300 L		65FR66443
20	Nonylphenol	1044051	28	6.6	7.0	1.7				71FR9337
21	Diquat	85007							20 L	SDWA
22	Endothall	145733							100 L	SDWA
23	Ether, Bis Chloromethyl	542881					0.00010 D, M	0.00029 D, M		65FR66443
24	Cis-1, 2-dichloroethylene	156592							70 L	SDWA
25	Ethylene dibromide								0.05 M	SDWA

Non Priority Pollutant		CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
			CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:		MCL (µg/L)	
							Water & Organism (µg/L)	Organism Only (µg/L)		
26	Fluoride	7681494							4000 L	SDWA
27	Glyphosate	1071836							700 L	SDWA
28	Guthion	86500		0.01 E		0.01 E				Gold Book
29	Hexachlorocyclo-hexane-Technical	608731					0.0123 L	0.0414 L		Gold Book
30	Malathion	121755		0.1 E		0.1 E				Gold Book
31	Methoxychlor	72435		0.03 E		0.03 E	100 A, L		40 L	Gold Book SDWA
32	Mirex	2385855		0.001 E		0.001 E				Gold Book
33	Nitrates	14797558					10,000 L		10,000 L	SDWA Gold Book
34	Nitrites	14797650							1,000 L	SDWA
35	Nitrogen, Total		NARRATIVE STATEMENT AND NUMERIC CRITERIA - SEE TEXT							State Standard
36	Nitrosamines						0.0008 L	1.24 L		Gold Book
37	Nitrosodibutylamine, N	924163					0.0063 A, M	0.22 A, M		65FR66443
38	Nitrosodiethylamine, N	55185					0.0008	1.24 A, M		Gold Book

Non Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
		CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:		MCL (µg/L)	
						Water & Organism (µg/L)	Organism Only (µg/L)		
						A, M			
39	Nitrosopyrrolidine, N	930552				0.016 M	34 M		65FR66443
40	Oil and Grease		NARRATIVE STATEMENT – SEE TEXT						Gold Book
41	Oxamyl	23135220						200 L	SDWA
42	Oxygen, Dissolved	7782447	WARMWATER, COLDWATER, AND EXCEPTIONS FOR NATURAL CONDITIONS - SEE TEXT K						Gold Book State Standard
43	Diazinon	333415	0.17	0.17	0.82	0.82			71FR9336
44	Parathion	56382	0.065 H	0.013 H					Gold Book
45	Pentachlorobenzene	608935					1.4 E	1.5 E	65FR66443
46	PH		SEE TEXT I						Gold Book State Standard
47	Phosphorus, Total		NARRATIVE STATEMENT AND NUMERIC CRITERIA - SEE TEXT						State Standard
48	Picloram	1918021						500 L	SDWA
49	Salinity		NARRATIVE STATEMENT - SEE TEXT						Gold Book
50	Simazine	122349						4 L	SDWA

Non Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source	
		CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:		MCL (µg/L)		
						Water & Organism (µg/L)	Organism Only (µg/L)			
51	Solids,Suspended,and Turbidity		NARRATIVE STATEMENT AND NUMERIC CRITERIA - SEE TEXT							Gold Book State Standard
52	Styrene	100425							100 L	SDWA
53	Sulfide-Hydrogen Sulfide	7783064		2.0 E		2.0 E				Gold Book
54	Tainting Substances		NARRATIVE STATEMENT - SEE TEXT							Gold Book
55	Temperature		SPECIES DEPENDENT CRITERIA - SEE TEXT J							Red Book
56	1, 2, 4, 5-Tetrachlorobenzene	95943					0.97 D	1.1 D		65FR66443
57	Tributyltin (TBT)	688733	0.46	0.063	0.37	0.010				EPA 822-F-00-008
58	2, 4, 5-Trichlorophenol	95954					1,800 B, D	3,600 B, D		65FR66443
59	Xylenes, Total								10, 000 L	SDWA
60	Uranium								30	SDWA
61	Beta particles and photon emitters								4 Millirems/yr	SDWA
62	Gross alpha particle activity								15 picocuries per liter (pCi/l)	SDWA

Non Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
		CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	For Consumption of:		MCL (µg/L)	
						Water & Organism (µg/L)	Organism Only (µg/L)		
63	Radium 226 and Radium 228 (combined)							5 pCi/l	SDWA
64	Carbaryl	63252	2.1	2.1	1.6				77FR30280

Footnotes:

- A This human health criterion is the same as originally published in the Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value is now published in the Gold Book.
- B The organoleptic effect criterion is more stringent than the value presented in the non priority pollutants table.
- C According to the procedures described in the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, except possibly where a very sensitive species is important at a site, freshwater aquatic life should be protected if both conditions specified in Attachment 3 - Calculation of Freshwater Ammonia Criterion are satisfied.
- D This criterion has been revised to reflect The Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of April 8, 1998. The fish tissue bioconcentration factor (BCF) used to derive the original criterion was retained in each case.
- E The derivation of this value is presented in the Red Book (EPA 440/9-76-023, July, 1976).
- F This value is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in the following criteria document: Chloropyrifos (EPA 440/5-86-005).
- G A more stringent Maximum Residual Disinfection Level (MRDL) has been issued by EPA under the Safe Drinking Water Act. Refer to S.C. Regulation 61-58, *State Primary Drinking Water Regulations*.
- H This value is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water* (EPA-820-B-96-001). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the differences between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates. No decision concerning this criterion was affected by any considerations that are specific to the Great Lakes.
- I South Carolina has established some site-specific standards for pH. These site-specific standards are listed in S.C. Regulation 61-69, *Classified Waters*.
- J U.S. EPA, 1976, *Quality Criteria for Water 1976*.
- K South Carolina has established numeric criteria in Section G for waters of the State based on the protection of warmwater and coldwater species. For the exception to be used for waters of the State that do not meet the numeric criteria established for the waterbody due to natural conditions, South Carolina has specified the allowable deficit in Section D.4. and used the following document as a source. U.S. EPA, 1986, *Ambient Water Quality Criteria for Dissolved Oxygen*, EPA 440/5-86-003, National Technical Information Service, Springfield, VA. South Carolina has established some site-specific standards for DO. These site-specific standards are listed in S.C. Regulation 61-69, *Classified Waters*.
- L This criterion is a noncarcinogen. As prescribed in Section E of this regulation, application of this criterion for determining permit effluent limitations requires the use of 7Q10 or comparable tidal condition as determined by the Department
- M This criterion is based on an added carcinogenicity risk. As prescribed in Section E of this regulation, application of this criterion for permit effluent limitations requires the use annual average flow or comparable tidal condition as determined by the Department.

ORGANOLEPTIC EFFECTS

	Pollutant	CAS Number	Organoleptic Effect Criteria (µg/L)	FR Cite/Source
1	Acenaphthene	83329	20	Gold Book
2	Chlorobenzene	108907	20	Gold Book
3	3-Chlorophenol		0.1	Gold Book
4	4-Chlorophenol	106489	0.1	Gold Book
5	2, 3-Dichlorophenol		0.04	Gold Book
6	2, 5-Dichlorophenol		0.5	Gold Book
7	2, 6-Dichlorophenol		0.2	Gold Book
8	3, 4-Dichlorophenol		0.3	Gold Book
9	2, 4, 5-Trichlorophenol	95954	1	Gold Book
10	2, 4, 6-Trichlorophenol	88062	2	Gold Book
11	2, 3, 4, 6-Tetrachlorophenol		1	Gold Book
12	2-Methyl-4-Chlorophenol		1,800	Gold Book
13	3-Methyl-4-Chlorophenol	59507	3,000	Gold Book
14	3-Methyl-6-Chlorophenol		20	Gold Book
15	2-Chlorophenol	95578	0.1	Gold Book
16	Copper	7440508	1,000	Gold Book
17	2, 4-Dichlorophenol	120832	0.3	Gold Book
18	2, 4-Dimethylphenol	105679	400	Gold Book

	Pollutant	CAS Number	Organoleptic Effect Criteria (µg/L)	FR Cite/Source
19	Hexachlorocyclopentadiene	77474	1	Gold Book
20	Nitrobenzene	98953	30	Gold Book
21	Pentachlorophenol	87865	30	Gold Book
22	Phenol	108952	300	Gold Book
23	Zinc	7440666	5,000	45FR79341

Footnote:

These criteria are based on organoleptic (taste and odor) effects. Because of variations in chemical nomenclature systems, this listing of pollutants does not duplicate the listing in Appendix A of 40 CFR Part 423. Also listed are the Chemical Abstracts Service (CAS) registry numbers, which provide a unique identification for each chemical.

WATER QUALITY CRITERIA ADDITIONAL NOTES

1. Criteria Maximum Concentration and Criterion Continuous Concentration

The Criteria Maximum Concentration (CMC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The Criterion Continuous Concentration (CCC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. The CMC and CCC are just two of the six parts of an aquatic life criterion; the other four parts are the acute averaging period, chronic averaging period, acute frequency of allowed exceedance, and chronic frequency of allowed exceedance.

2. Criteria for Priority Pollutants, Non Priority Pollutants and Organoleptic Effects

This appendix lists all priority toxic pollutants and some nonpriority toxic pollutants, and both human health effect and organoleptic effect criteria issued pursuant to CWA §304(a), the SDWA, and the NPDWR. Blank spaces indicate that EPA has no CWA §304(a) criteria recommendations. Because of variations in chemical nomenclature systems, this listing of toxic pollutants does not duplicate the listing in Appendix A of 40CFR Part 423.

3. Human Health Risk

The human health criteria for the priority and non priority pollutants are based on carcinogenicity of 10^{-6} risk.

4. Water Quality Criteria published pursuant to Section 304(a) or Section 303(c) of the CWA

Many of the values in the appendix were published in the California Toxics Rule. Although such values were published pursuant to Section 303(c) of the CWA, they represent the EPA's most recent calculation of water quality criteria.

5. Calculation of Dissolved Metals Criteria

The 304(a) criteria for metals are shown as total recoverable metals. As allowed in Section E of this regulation, these criteria may be expressed as dissolved metals. Dissolved metals criteria may be calculated in one of two ways (please refer to Attachments). For freshwater metals criteria that are hardness-dependent, the dissolved metal criteria may be calculated using a hardness of 25 mg/l mg/L as expressed as CaCO_3 . Saltwater and freshwater metals' criteria that are not hardness-dependent are calculated by multiplying the total recoverable criteria before rounding by the appropriate conversion factors. The final metals' criteria in the table are rounded to two significant figures. Information regarding the calculation of hardness dependent conversion factors are included in the footnotes.

6. Chemical Abstract Services Number

The Chemical Abstract Services number (CAS) for each pollutant is provided (where available).

7. Gold Book Reference

The Gold Book reference listed in the appendix refers to the May 1, 1986 EPA publication EPA 440/5-86-001.

8. Federal Register Reference

The FR listed in the appendix refers to the appropriate *Federal Register* listing and source refers to the origin of the value. Many of the numeric values contained in this appendix have been modified, revised, or altered and therefore, the source as listed may not be the same as it appears in this table. Also, South Carolina may have selected to use a different value or may have promulgated a different value in its previous iterations of this regulation, so differences from these sources should be expected.

9. Maximum Contaminant Levels

The appendix includes Maximum Contaminant Levels (MCLs) developed under the Safe Drinking Water Act (SDWA) and the National Primary Drinking Water Regulation (NPDWR).

10. Organoleptic Effects

The appendix contains 304(a) criteria for pollutants with toxicity-based criteria as well as non-toxicity based criteria. The basis for the non-toxicity based criteria are organoleptic effects (e.g., taste and odor) which would make water and edible aquatic life unpalatable but not toxic to humans. The table includes criteria for organoleptic effects for 23 pollutants. Pollutants with organoleptic effect criteria more stringent than the criteria based on toxicity (e.g., included in both the priority and non-priority pollutant tables) are footnoted as such.

11. Category Criteria

In the 1980 criteria documents, certain water quality criteria were published for categories of pollutants rather than for individual pollutants within that category. Subsequently, in a series of separate actions, the EPA derived criteria for specific pollutants within a category. Therefore, in this appendix South Carolina is replacing criteria representing categories with individual pollutant criteria (e.g., 1, 3-dichlorobenzene, 1, 4-dichlorobenzene and 1, 2-dichlorobenzene).

12. Specific Chemical Calculations

A. Selenium

(1) Human Health

In the 1980 Selenium document, a criterion for the protection of human health from consumption of water and organisms was calculated based on a BCF of 6.0 l/kg and a maximum water-related contribution of 35 Φ g Se/day. Subsequently, the EPA Office of Health and Environmental Assessment issued an errata notice (February 23, 1982), revising the BCF for selenium to 4.8 L/kg. In 1988, EPA issued an addendum (ECAO-CIN-668) revising the human health criteria for selenium. Later in the final National Toxic Rule (NTR, 57 FR 60848), EPA withdrew previously published selenium human health criteria, pending EPA review of new epidemiological data.

This appendix includes human health criteria for selenium, calculated using a BCF of 4.8 L/kg along with the current IRIS RfD of 0.005 mg/kg/day. South Carolina included these water quality criteria in the appendix because the data necessary for calculating a criteria in accordance with EPA's 1980 human health methodology are available.

(2) Aquatic Life

This appendix contains aquatic life criteria for selenium that are the same as those published in the CTR. In the CTR, EPA proposed an acute criterion for selenium based on the criterion proposed for selenium in the Water Quality Guidance for the Great Lakes System (61FR584440). The GLI and CTR proposals take into account data showing that selenium's two prevalent oxidation state in water, selenite and selenate, present differing potentials for aquatic toxicity, as well as new data indication that various forms of selenium are additive. The new approach produces a different selenium acute criterion concentration, or CMC, depending upon the relative proportions of selenite, selenate, and other forms of selenium that are present. EPA is currently undertaking a reassessment of selenium, and expects the 304(a) criterion for selenium will be revised based on the final reassessment (63FR26186). However, until such time as revised water quality criteria for selenium are published by the EPA, the water quality criteria in this appendix are EPA's current 304(a) criteria.

B. Chromium (III)

The aquatic life water quality criteria for chromium (III) included in the appendix are based on the values presented in the document titled: *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water*.

C. PCBs

In this appendix, South Carolina is publishing aquatic life and human health criteria based on total PCBs rather than individual arochlors.

Attachment 1 - Conversion Factors for Dissolved Metals

Metal	Conversion Factor freshwater CMC	Conversion Factor freshwater CCC	Conversion Factor saltwater CMC	Conversion Factor saltwater CCC
Arsenic	1.000	1.000	1.000	1.000
Cadmium	$1.136672 - [(\ln \text{hardness})(0.041838)]$	$1.101672 - [(\ln \text{hardness})(0.041838)]$	0.994	0.994
Chromium III	0.316	0.860	--	--

Metal	Conversion Factor freshwater CMC	Conversion Factor freshwater CCC	Conversion Factor saltwater CMC	Conversion Factor saltwater CCC
Chromium VI	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	$1.46203 - [(\ln \text{hardness})(0.145712)]$	$1.46203 - [(\ln \text{hardness})(0.145712)]$	0.951	0.951
Mercury	0.85	0.85	0.85	0.85
Nickel	0.998	0.997	0.990	0.990
Selenium	--	--	0.998	0.998
Silver	0.85	--	0.85	--
Zinc	0.978	0.986	0.946	0.946

Attachment 2 - Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent

Chemical	m _A	b _A	m _C	b _C	Freshwater Conversion Factors (CF)	
					Acute	Chronic
Cadmium	0.9789 A	-3.866 A	0.7977 A	-3.909 A	1.136672-[ln (hardness)(0.041838)]	1.101672-[ln (hardness)(0.041838)]
Chromium III	0.8190	3.7256	0.8190	0.6848	0.316	0.860
Copper	0.9422	-1.700	0.8545	-1.702	0.960	0.960
Lead	1.273	-1.460	1.273	-4.705	1.46203-[ln (hardness)(0.145712)]	1.46203-[ln (hardness)(0.145712)]
Nickel	0.8460	2.255	0.8460	0.0584	0.998	0.997
Silver	1.72	-6.52	--	--	0.85	--
Zinc	0.8473	0.884	0.8473	0.884	0.978	0.986

Hardness-dependent metals criteria may be calculated from the following:

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

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

Footnotes:

A This parameter was issued by the EPA in Aquatic Life Ambient Water Quality Criteria Cadmium - 2016 (EPA-820-R-16-002).

Attachment 3 - Calculation of Freshwater Ammonia Criterion

1. The one-hour average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CMC calculated using the following equation:

$$\text{CMC} = \frac{0.275}{1+10^{7.204-\text{pH}}} + \frac{39.0}{1+10^{\text{pH}-7.204}}$$

In situations where salmonids are absent, the CMC may be calculated using the following equation:

$$\text{CMC} = \frac{0.411}{1+10^{7.204-\text{pH}}} + \frac{58.4}{1+10^{\text{pH}-7.204}}$$

2. The thirty-day average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CCC calculated using the following equations:

When fish early life stages (ELS) are present:

$$\text{CCC} = \left(\frac{0.0577}{1+10^{7.688-\text{pH}}} + \frac{2.487}{1+10^{\text{pH}-7.688}} \right) \times \min(2.85, 1.45 \times 10^{0.028 \times (25-T)})$$

When fish early life stages are absent:

$$\text{CCC} = \left(\frac{0.0577}{1+10^{7.688-\text{pH}}} + \frac{2.487}{1+10^{\text{pH}-7.688}} \right) \times 1.45 \times 10^{0.028 \times (25-\max(T,7))}$$

and the highest four-day average within the 30-day period does not exceed 2.5 times the CCC.

In the absence of information substantiating that ELS are absent, the ELS present equation will be used

Attachment 4 - Calculation of the Sample Specific Freshwater Acute and Chronic Criterion for Metals

As provided in R.61-68.E.14.d(3), in order to “appropriately evaluate the ambient water quality for the bioavailability of the dissolved portion of hardness dependent metals, the Department may utilize a federally-approved methodology to predict the dissolved fraction or partitioning coefficient in determining compliance with the water quality standards.” Per R.61-68.E.14.a(3), the Criterion Maximum Concentration (CMC) and the Criterion Continuous Concentration (CCC) are based on a hardness of 25 mg/L if the ambient stream hardness is equal to or less than 25 mg/L. Concentrations of hardness less than 400 mg/L may be based on the stream hardness if it is greater than 25 mg/L and less than 400 mg/L, and 400 mg/L if the ambient stream hardness is greater than 400 mg/L. In absence of actual stream hardness it is assumed to be 25 mg/L.

1. Conversion Factor for Dissolved Metals

Refer to R.61-68, *Water Classifications and Standards*, Attachment 2 - Parameters for Calculating Freshwater Dissolved Metals Criteria that are Hardness-Dependent to determine the appropriate parameters and conversion factor. Both CMC and CCC may be expressed as total recoverable or dissolved using the appropriate equations found in Attachment 2.

2. Partitioning Coefficient (Translator)

The partitioning coefficient (K_p) is a translator for the fraction of the total recoverable metal that is bound to adsorbents in the water column, i.e. TSS. The calculation of partitioning coefficients is determined using the following equation.

$$K_P = K_{PO} \times (TSS_b)^\alpha$$

where K_P has units of L/kg

TSS_b = In-stream Total Suspended Solids concentration in mg/L

Parameters for default partition coefficient estimation equations (K_{PO} and α) are provided from Table 3 of *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From A Dissolved Criterion*, EPA 823-B-96-007.

Metal	Lakes		Streams	
	K_{PO}	α	K_{PO}	α
Cadmium	3.52E+06	-0.9246	4.00E+06	-1.1307
Chromium III	2.17E+06	-0.2662	3.36E+06	-0.9304
Copper	2.85E+06	-0.9000	1.04E+06	-0.7436
Lead	2.0E+06	-0.5337	2.80E+06	-0.8
Nickel	2.21E+06	-0.7578	4.90E+05	-0.5719
Zinc	3.34E+06	-0.6788	1.25E+06	-0.7038

3. Final Sample Specific Total Recoverable CMC or CCC ($\mu\text{g/L}$) Adjusted for In-Situ Hardness and TSS

The instream total recoverable concentration is determined using Equation 6.4 of *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From A Dissolved Criterion*, EPA 823-B-96-007.

$$\text{CMC (total recoverable adjusted)} = \text{CMC (dissolved)} \times \{1 + (K_P \times TSS_b \times 10^{-6})\}$$

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

$$K_P = K_{PO} \times (TSS_b)^\alpha$$

TSS_b = In-stream Total Suspended Solids concentration in mg/L

10^{-6} = Units conversion factor to express CMC (total recoverable adjusted) in $\mu\text{g/L}$

$$\text{CCC (total recoverable adjusted)} = \text{CCC (dissolved)} \times \{1 + (K_P \times TSS_b \times 10^{-6})\}$$

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

$$K_P = K_{PO} \times (TSS_b)^\alpha$$

TSS_b = In-stream Total Suspended Solids concentration in mg/L

10^{-6} = Units conversion factor to express CCC (total recoverable adjusted) in $\mu\text{g/L}$.

Note: The background TSS is assumed to be the measured instream data (mg/L) or 1 mg/L in the absence of actual instream data (based on the 5th percentile of ambient TSS data on South Carolina waterbodies from 1993-2000).

If the ambient stream metals result exceeds CMC (total recoverable adjusted) or CCC (total recoverable adjusted) based on the measured TSS and hardness collected with the metal sample it constitutes a standard exceedance. Lacking actual instream TSS and hardness data, a metals result exceeding CMC (total recoverable adjusted) or CCC (total recoverable adjusted) based on the default hardness of 25 mg/L and the default TSS value of 1 mg/L constitutes a potential standard exceedance.