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Water: Current Water Quality Criteria

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National Recommended Water Quality Criteria

EPA's compilation of national recommended water quality criteria is presented as a summary table containing recommended water quality criteria for the protection of aquatic life and human health in surface water for approximately 150 pollutants. These criteria are published pursuant to Section 304(a) of the Clean Water Act (CWA) and provide guidance for states and tribes to use in adopting water quality standards.

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- Fact Sheet (May 25, 2005)
- Previous versions of National Recommended Water Quality Criteria Table
- Chemical-specific criteria documents from the 1980s
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Aquatic Life Criteria Table

			Freshwater		Saltwater		
Pollutant	CAS Number	P/NP*	CMC.1 (acute) (µg/L)	CCC.1 (chronic) (µg/L)	CMC.1 (acute) (µg/L)	CCC.1 (chronic) (µg/L)	Publication Year
Acrolein	107028	P	3ug/L	3ug/L			2009
Aesthetic Qualities	—	NP	NARRATIVE STATEMENT—SEE DOCUMENT				1986
Aldrin	309002	P	3.0 G		1.3 G		1980
Alkalinity	—	NP		20000 C			1986
alpha-Endosulfan	959988	P	0.22 G,Y	0.056 G,Y	0.034 G,Y	0.0087 G,Y	1980
Aluminum pH 6.5 – 9.0	7429905	NP	750 I	87 I,S			1988
Ammonia	7664417	NP	FRESHWATER CRITERIA ARE pH, Temperature and Life-stage DEPENDENT SALTWATER CRITERIA ARE pH AND TEMPERATURE DEPENDENT				1999
Arsenic	7440382	P	340 A,D	150 A,D	69 A,D	36 A,D	1995
Bacteria	—	NP	FOR PRIMARY RECREATION AND SHELLFISH USES—SEE DOCUMENT				1986
beta-Endosulfan	33213659	P	0.22 G,Y	0.056 G,Y	0.034 G,Y	0.0087 G,Y	1980
Boron	—	NP	NARRATIVE STATEMENT—SEE DOCUMENT				1986
Carbaryl	63252	NP	2.1	2.1	1.6		2012
Cadmium	7440439	P	2.0 D,E	0.25 D,E	40 D	8.8 D	2001
Chlordane	57749	P	2.4 G	0.0043 G	0.09 G	0.004 G	1980
Chloride	16887006	NP	860000	230000			1986
Chlorine	7782505	NP	19	11	13	7.5	1986
Chloropyrifos	2921882	NP	0.083	0.041	0.011	0.0056	1986
Chromium (III)	16065831	P	570 D,E	74 D,E			1995
Chromium (VI)	18540299	P	16 D	11 D	1,100 D	50 D	1995
Color	—	NP	NARRATIVE STATEMENT—SEE DOCUMENT				1986
Copper	7440508	P	Freshwater criteria calculated using the BLM mm - See Document		4.8 D,cc	3.1 D,cc	2007
Cyanide	57125	P	22 Q	5.2 Q	1 Q	1 Q	1985

Demeton	8065483	NP		0.1 C		0.1 C	1985
Diazinon	333415	NP	0.17ug/L	0.17ug/L	0.82ug/L	0.82ug/L	2005
Dieldrin	60571	P	0.24	0.056 O	0.71 G	0.0019 G	1995
Endrin	72208	P	0.086	0.036 O	0.037 G	0.0023 G	1995
gamma-BHC (Lindane)	58899	P	0.95		0.16 G		1995
Gases, Total Dissolved	—	NP	NARRATIVE STATEMENT—SEE DOCUMENT C				1986
Guthion	86500	NP		0.01 C		0.01 C	1986
Hardness	—	NP	NARRATIVE STATEMENT—SEE DOCUMENT				1986
Heptachlor	76448	P	0.52 G	0.0038 G	0.053 G	0.0036 G	1980
Heptachlor Epoxide	1024573	P	0.52 G,V	0.0038 G,V	0.053 G,V	0.0036 G,V	1981
Iron	7439896	NP		1000 C			1986
Lead	7439921	P	65 D,E	2.5 D,E	210 D	8.1 D	1980
Malathion	121755	NP		0.1 C		0.1 C	1986
Mercury Methylmercury	7439976 22967926	P	1.4 D,hh	0.77 D,hh	1.8 D,ee,hh	0.94 D,ee,hh	1995
Methoxychlor	72435	NP		0.03 C		0.03 C	1986
Mirex	2385855	NP		0.001 C		0.001 C	1986
Nickel	7440020	P	470 D,E	52 D,E	74 D	8.2 D	1995
Nonylphenol	84852153	NP	28ug/L	6.6ug/L	7ug/L	1.7ug/L	2005
Nutrients	—	NP	See EPA's Ecoregional criteria for Total Phosphorus, Total Nitrogen, Chlorophyll a and Water Clarity (Secchi depth for lakes; turbidity for streams and rivers) (& Level III Ecoregional criteria)				
Oil and Grease	—	NP	NARRATIVE STATEMENT—SEE DOCUMENT C				1986
Oxygen, Dissolved Freshwater Oxygen, Dissolved Saltwater	7782447	NP	WARMWATER AND COLDWATER MATRIX—SEE DOCUMENT SALTWATER—SEE DOCUMENT				1986
Parathion	56382	NP	0.065 I	0.013 I			1995
Pentachlorophenol	87865	P	19 F	15 F	13	7.9	1995
pH	—	NP		6.5 – 9 C		6.5 – 8.5 C,P	1986
Phosphorus Elemental	7723140	NP					1986
Polychlorinated Biphenyls (PCBs)		P		0.014 N		0.03 N	
Selenium	7782492	P	L	5.0	290 D, dd	71 D, dd	1995
Silver	7440224	P	3.2 D,E,G		1.9 D,G		1980
Solids Suspended and Turbidity	—	NP	NARRATIVE STATEMENT—SEE DOCUMENT C				1986
Sulfide-Hydrogen Sulfide	7783064	NP		2.0 C		2.0 C	1986
Tainting Substances	—	NP	NARRATIVE STATEMENT—SEE DOCUMENT				1986
Temperature	—	NP	SPECIES DEPENDENT CRITERIA—SEE DOCUMENT M				1986
Toxaphene	8001352	P	0.73	0.0002	0.21	0.0002	1986
Tributyltin (TBT)	—	NP	0.46	0.072	0.42	0.0074	2004
Zinc	7440666	P	120 D,E	120 D,E	90 D	81 D	1995
4,4'-DDT	50293	P	1.1 G,ii	0.001 G, ii	0.13 G,ii	0.001 G, ii	1980

*P/NP – Indicates either a Priority Pollutant (P) or a Non Priority Pollutant (NP).

Footnotes

A This recommended 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. No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms

are additive. Please consult the criteria document for details.

C The derivation of this value is presented in the Red Book (EPA 440/9-76-023, July, 1976). The CCC of 20mg/L is a minimum value except where alkalinity is naturally lower, in which case the criterion cannot be lower than 25% of the natural level.

D Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria (PDF)," (49 pp, 3MB) October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available from the Water Resource center and 40CFR§131.36(b)(1). Conversion Factors applied in the table can be found in Appendix A to the Preamble- 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 100 mg/L. Criteria values for other hardness may be calculated per the equation presented in the criteria document.

F Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH. 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 (PDF) (153 pp, 7.3MB) (EPA 440/5-80-019), Chlordane (PDF) (68 pp, 3.1MB) (EPA 440/5-80-027), DDT (PDF) (175 pp, 8.3MB) (EPA 440/5-80-038), Endosulfan (PDF) (155 pp, 7.3MB) (EPA 440/5-80-046), Endrin (PDF) (103 pp, 4.6MB) (EPA 440/5-80-047), Heptachlor (PDF) (114 pp, 5.4MB) (EPA 440/5-80-052), Hexachlorocyclohexane (PDF) (109 pp, 4.8MB) (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 (PDF) (104 pp, 3.3MB). 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.

I This value for aluminum is expressed in terms of total recoverable metal in the water column.

J This value was derived using the GLI Guidelines (60 FR 15393-15399, 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.

M U.S. EPA. 1973. Water Quality Criteria 1972. EPA-R3-73-033. National Technical Information Service, Springfield, VA.; U.S. EPA. 1977. Temperature Criteria for Freshwater Fish: Protocol and Procedures. EPA 600/3-77-061. National Technical Information Service, Springfield, VA.

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

O The derivation of the CCC for this pollutant (Endrin) did not consider exposure through the diet, which is probably important for aquatic life occupying upper trophic levels.

P According to page 181 of the Red Book:

For open ocean waters where the depth is substantially greater than the euphotic zone, the pH should not be changed more than 0.2 units from the naturally occurring variation or any case outside the range of 6.5 to 8.5. For shallow, highly productive coastal and estuarine areas where naturally occurring pH variations approach the lethal limits of some species, changes in pH should be avoided but in any case should not exceed the limits established for fresh water, i.e., 6.5-9.0.

Q This recommended water quality criterion is expressed as ug free cyanide (as CN)/L.

S There are three major reasons why the use of Water-Effect Ratios might be appropriate.

1. The value of 87 µg/l is based on a toxicity test with the striped bass in water with pH = 6.5–6.6 and hardness <10 mg/L. Data in "Aluminum Water-Effect Ratio for the 3M Plant Effluent Discharge, Middleway, West Virginia" (May 1994) indicate that aluminum is substantially less toxic at higher pH and hardness, but the effects of pH and hardness are not well quantified at this time.
2. In tests with the brook trout at low pH and hardness, effects increased with increasing concentrations of total aluminum even though the concentration of dissolved aluminum was constant, indicating that total recoverable is a more appropriate measurement than dissolved, at least when particulate aluminum is primarily aluminum hydroxide particles. In surface waters, however, the total recoverable procedure might measure aluminum associated with clay particles, which might be less toxic than aluminum associated with aluminum hydroxide.
3. EPA is aware of field data indicating that many high quality waters in the U.S. contain more than 87 g aluminum/L, when either total recoverable or dissolved is measured.

V 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.

Y This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

cc When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.

dd 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 µg/L in salt water because the saltwater CCC does not take into account uptake via the food chain.

ee This recommended water quality criterion was derived on page 43 of the mercury criteria document (PDF) (144 pp, 6.4MB) (EPA 440/5-84-026, January 1985). The saltwater CCC of 0.025 ug/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 (60 FR 15393-15399, March 23, 1995), the Agency no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.

hh This recommended 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.

ll This criterion applies to DDT and its metabolites (i.e., the total concentration of DDT and its metabolites should not exceed this value).

mm The available toxicity data, when evaluated using the procedures described in the "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" indicate that freshwater aquatic life should be protected if the 24-hour average and four-day average concentrations do not respectively exceed the acute and chronic criteria concentrations calculated by the Biotic Ligand Model.

Human Health Criteria Table

			Human Health for the consumption of		
Pollutant	CAS Number	P/NP*	Water + Organism (µg/L)	Organism Only (µg/L)	Publication Year
Acenaphthene	83329	P	670 B,U	990 B,U	2002
Acrolein	107028	P	6 ll	9 ll	2009
Acrylonitrile	107131	P	0.051 B,C	0.25 B,C	2002
Aldrin	309002	P	0.000049 B,C	0.000050 B,C	2002
Alkalinity	—	NP			
alpha-BHC	319846	P	0.0026 B,C	0.0049 B,C	2002
alpha-Endosulfan	959988	P	62 B	89 B	2002
Aluminum pH 6.5 – 9.0	7429905	NP			
Anthracene	120127	P	8,300 B	40,000 B	2002
Antimony	7440360	P	5.6 B	640 B	2002
Arsenic	7440382	P	0.018 C,M,S	0.14 C,M,S	1992
Asbestos	1332214	P	7 million fibers/L I		1991
Barium	7440393	NP	1,000 A		1986
Benzene	71432	P	2.2 B,C	51 B,C	2002
Benzidine	92875	P	0.000086 B,C	0.00020 B,C	2002
Benzo(a) Anthracene	56553	P	0.0038 B,C	0.018 B,C	2002
Benzo(a) Pyrene	50328	P	0.0038 B,C	0.018 B,C	2002
Benzo(b) Fluoranthene	205992	P	0.0038 B,C	0.018 B,C	2002
Benzo(k) Fluoranthene	207089	P	0.0038 B,C	0.018 B,C	2002
Beryllium	7440417	P	Z		
beta-BHC	319857	P	0.0091 B,C	0.017 B,C	2002
beta-Endosulfan	33213659	P	62 B	89 B	2002
Bis(2-Chloroethyl) Ether	111444	P	0.030 B,C	0.53 B,C	2002
Bis(2-Chloroisopropyl) Ether	108601	P	1,400 B	65,000 B	2002
Bis(2-Ethylhexyl) PhthalateX	117817	P	1.2 B,C	2.2 B,C	2002
Bromoform	75252	P	4.3 B,C	140 B,C	2002
Butylbenzyl PhthalateW	85687	P	1,500 B	1,900 B	2002
Cadmium	7440439	P	Z		
Carbon Tetrachloride	56235	P	0.23 B,C	1.6 B,C	2002
Chlordane	57749	P	0.00080 B,C	0.00081 B,C	2002
Chlorobenzene	108907	P	130 Z,U	1,600 U	2003
Chlorodibromomethane	124481	P	0.40 B,C	13 B,C	2002
Chloroform	67663	P	5.7 C,P	470 C,P	2002
Chlorophenoxy Herbicide (2,4-D)	94757	NP	100 Z		1986