Fact Sheet Date: March 12, 1998

NEW YORK STATE
- AQUATIC FACT SHEET -

Ambient Water Quality Values for Protection of Aquatic Life

SUBSTANCE: Pentachlorophenol **CAS REGISTRY NUMBER:** 87-86-5

TYPE:	BASIS:	FRESHWATER AMBIENT WATER QUALITY VALUE (ug/L):
Chronic	Propagation	$e^{[1.005(pH) - 5.134]}$
Acute	Survival	$e^{[1.005(pH) - 4.869]}$

INTRODUCTION

These values apply to the water column and are designed to protect aquatic life from the effects of waterborne contaminants. Values for the protection of propagation of aquatic life are referred to as Aquatic (Chronic) or A(C) values. Values for the protection of survival of aquatic life are referred to as Aquatic (Acute) or A(A) values.

SUMMARY OF INFORMATION AND DERIVATION OF VALUE

U.S. EPA (1995a,b) has derived acute and chronic aquatic life criteria for pentachlorophenol for the Great Lakes Water Quality Initiative (GLI). The Department has reviewed these criteria and determined that they are based on appropriate data and derived according to the scientific procedures in current and proposed 6 NYCRR Part 702. They are thus determined to be appropriate ambient water quality values for protection of aquatic life for New York State.

The attachment to this fact sheet provides U.S. EPA's derivation of the values. U.S. EPA's Criterion Continuous Concentration (CCC) and Criterion Maximum Concentration (CMC) are equivalent to New York's Aquatic (Chronic) and Aquatic (Acute) values respectively. Note: U.S. EPA's chronic value, or CCC, is incorrectly referred to as a CMC in Table 2 of the Federal Register (U.S. EPA, 1995a).

REFERENCES

U.S. EPA (Environmental Protection Agency). 1995a. Final Water Quality Guidance for the Great Lakes System. 60 Federal Register: 15366 - 15425. March 23, 1995.

U.S. EPA (Environmental Protection Agency) 1995b. Great Lakes Water Quality Initiative Criteria Documents for the Protection of Aquatic Life in Ambient Water. EPA-820-B-95-004. March 1995.

New York State Department of Environmental Conservation
Division of Water
SJS
February 5, 1997

ATTACHMENT

GREAT LAKES WATER QUALITY INITIATIVE

Tier 1 Aquatic Life Criterion for Pentachlorophenol

No new aceptable acute or chronic data for pentachlorophenol were found. Therefore, the data given in Tables 1 and 2 of the criteria document for pentachlorophenol (U.S. EPA 1986) were used to obtain the values given in Table M1. Because the toxicity of pentachlorophenol is pH-dependent, all acute values in Table M1 have been adjusted to a pH of 6.5.

Criterion Maximum Concentration (CMC)

Some of the Genus Mean Acute Values given in Table 3 of U.S. EPA (1985) were changed because of the new taxonomy for salmonids and because the values for Jordanella floridae and Rana catesbeiana had been incorrectly adjusted to a pH of 6.5 and because the SMAV for Gammarus pseudolimnaeus had been calculated incorrectly. The Final Acute Value (FAV) was calculated using the four lowest Genus Mean Acute Values given in Table M1, resulting in a FAV of 10.56 ug/L at a pH of 6.5. This value did not need to be lowered to protect a commercially or recreationally important species of the Great Lakes System. The CMC was calculated by dividing the FAV by 2, resulting in a CMC of 5.28 ug/L at a pH of 6.5. The CMC was related to pH using the slope of 1.005 that was derived in U.S. EPA (1986):

$$CMC = e^{1.005(pH) - 4.869}$$

Criterion Continuous Concentration (CCC)

Insufficient chronic toxicity data were available to calculate a Final Chronic Value (FCV) using the eight-family procedure. Sufficient chronic data were available to calculate a FCV by dividing the FAV by the Final Acute-Chronic Ratio (FACR). Six Species Mean ACRs were available (Table M1), but two of them were "greater than" values. The range of the other four was less than a factor of 6. The FACR was calculated as the geometric mean of the four similar SMACRs and was 2.608. The FCV = FAV/FACR = (10.56 ug/L)/(2.608) = 4.049 ug/L at a pH of 6.5. This value did not need to be lowered to protect a commercially or recreationally important species of the Great Lakes System. The CCC was 4.049 ug/L at a pH of 6.5. The CCC was related to pH using the slope of 1.005:

$$CCC = e^{1.005(pH) - 5.134}$$

The Criterion

The procedures described in the GLI Tier 1 methodology indicate that, except possibly where a locally important species is very sensitive, aquatic organisms should not be affected unacceptably if the four-day average concentration of pentachlorophenol does not exceed the numerical value (in ug/L) given by the equation

$$CCC = e^{1.005(pH) - 5.134}$$

more than once every three years on the average and if the one-hour average concentration does not exceed the numerical value (in ug/L) given by the equation

$$CMC = e^{1.005(pH) - 4.869}$$

more than once every three years on the average.

Table M1. Ranked Genus Mean Acute Values for Pentachlorophenol

Rank*	Genus Mean Acute Value (ug/L)**	Species	Species Mean Acute Value (ug/L)**	Species Mean Acute-Chronic Ratio
32	>43920	Crayfish, Orconectes immunis	>43920	-----
31	11260	Midge, Tanytarsus dissimilis	11260	-----
30	10610	Sciomyzid, Sepedon fuscipennis	10610	-----
29	417.7	Tubificid worm, Rhyacodrilus montana	417.7	-----
28	408.2	Tubificid worm, Stylodrilus heringianus	408.2	-----
27	403.2	Snail, Gilila altilis	403.2	-----
26	361.6	Tubificid worm, Spirosperma ferox	239.5	-----
		Tubificid worm, Spirosperma nikoiskyl	545.8	-----
25	317.5	Tubificid worm, Quistadrilus multisetosus	317.5	-----
24	306.7	Flagfish, Jordanella floridae	306.7	-----
23	224.2	Tubificid worm, Tubifex tubifex	224.2	-----
22	195.4	Guppy, Poecilia reticulata	195.4	-----
21	182.5	Tubificid worm, Limnodrilus hoffmeisteri	182.5	-----
20	172.1	Amphipod, Crangonyx pseudogracilis	172.1	-----
19	155.9	Tubificid worm, Branchiura sowerbyi	155.9	-----

Table M1. (Cont.)

Rank*	Genus Mean Acute Value (ug/L)**	Species	Species Mean Acute Value (ug/L)**	Species Mean Acute-Chronic Ratio

18	132.1	Snail, Physa gyrina	132.1	>10.27***
17	105.0	Largemouth bass, Micropterus salmoides	105.0	-----
16	91.48	Amphipod, Gammarus pseudolimnaeus	91.48	-----
15	87.48	Amphipod, Hyalella azteca	87.48	-----
14	78.10	Cladoceran, Daphnia pulex	90.83	-----
		Cladoceran, Daphnia magna	67.15	2.5
13	67.13	Cladoceran, Ceriodaphnia reticulata	67.13	>15.79***
12	65.53	Goldfish, Carassius auratus	65.53	-----
11	63.11	Fathead minnow, Pimephales promelas	63.11	4.535
10	60.50	Mosquitofish, Gambusia affinis	60.50	-----
9	60.43	Snail, Aplexa hypnorum	60.43	-----
8	58.47	Tubificid worm, Varichaeta pacifica	58.47	-----
7	57.72	Cladoceran, Simocephalus vetulus	57.72	0.8945
6	56.41	Bluegill, Lepomis macrochirus	56.41	-----
5	34.13	Brook trout, Salvelinus fontinalis	34.13	-----

Table M1. (Cont.)

Rank*	Genus Mean Acute Value (ug/L)**	Species	Species Mean Acute Value (ug/L)**	Species Mean Acute-Chronic Ratio
4	33.91	Bullfrog, Rana catesbeiana	33.91	-----

3	31.26	Rainbow trout, Oncorhynchus mykiss	35.34	4.564
		Coho salmon, Oncorhynchus kisutch	31.82	-----
		Sockeye salmon, Oncorhynchus nerka	32.85	-----
		Chinook salmon, Oncorhynchus tshawytscha	25.85	-----
2	26.54	Channel catfish, Ictalurus punctatus	26.54	-----
1	4.355	Common carp, Cyprinus carpio	4.355	-----

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* Ranked from most resistant to most sensitive based on Genus Mean Acute Value.
** At pH = 6.5.
*** Not used in the calculation of the Final Acute-Chronic Ratio.

At pH = 6.5:

FAV = 10.56 ug/L

CMC = FAV/2 = 5.28 ug/L

As a function of pH:

$$CMC = e^{1.005(pH) - 4.869}$$

FACR = 2.608

At pH = 6.5:

FCV = FAV/FACR = (10.56 ug/L)/(2.608) = 4.049 ug/L = CCC

As a function of pH:

$$CCC = e^{1.005(pH) - 5.134}$$

References

U.S. EPA. 1986. Ambient Aquatic Life Water Quality Criteria for Pentachlorophenol. EPA 440/5-88-009. National Technical Information Service, Springfield, VA.