NOTE OF EXPLANATION FOR AQUATIC FACT SHEETS FOR CYANIDE

The Aquatic Type numerical values for cyanide are supported by more than one Fact Sheet. The reader is referred to both of the attached Fact Sheets, dated March 1998 and July 17, 1985, for the documentation for these values.

VALUE(S) ADDED 7-24-85

FACT SHEET REVISED _____

VALUE(S) REMOVED _____

Date: July 17, 1985

Surface Water Quality
Standard Documentation

Chemical: Cyanide, free

C.A.S, No.(s): NA

Basis (Human/Aquatic): Aquatic

Standard by Water Classification:

	ug/l	Notes
Classes AA,AA-s;A;A-s;B;C	5.2	H
Class D	22	H
Classes SA;SB;SC;I	1.0	H
Class SD	1.0	H

Remarks: Free cyanide - the sum of cyanide present as HCN and CN^-, expressed as CN.

Summary of Information

1. EPA. 1976. Quality criteria for water. EPA 440/9-76-023, USEPA, Wash., D.C. 256 pp.

   -criterion: "5.0 ug/l for freshwater and marine aquatic life and wildlife".

   -based on adverse effects on fish observed at as low as 10 ug/l.

2. NYS DEC. 1978. Rationale document for specific water quality standards. Unpub. document submitted at DEC hearing on NYS Proposed Classifications and Standards of Quality and Purity (6 NYCRR Parts 700, 701, 702 and 704).

   -recommended standard: "0.005 mg/l. cyanide as HCN plus CN for the protection of fish and other aquatic life."

   -based on chronic test results with a variety of fish species; noted that further long-term, low temperature studies may require re-evaluation.

3. IJC. 1978. Group 2 proposed new and revised water quality objectives. International Joint Commission, Regional Office, Windsor, Ont. 195 pp.

-criterion: "Concentrations of free cyanide in an unfiltered water sample should not exceed 5 micrograms per litre for the protection of aquatic life."

-"Based upon chronic effects on fish growth and reproduction...".

4. EPA. 1985. Ambient water quality for cyanide-proposed final. USEPA, Wash., D.C. 59 pp.

-criteria derived following the revised National Guidelines:

-freshwater: 5.2 ug/l as a 4-day average and 22 ug/l not to be exceeded as a one hour average.

-saltwater: 1.0 ug/l as a one hour average to prevent both acute and chronic toxicity).

Standard Derivation

The cyanide criteria proposed by EPA (1985) are the product of the most recent review and evaluation of the literature on cyanide toxicity and follows revised National Guidelines. The criteria proposed as a 4-day average in freshwater and the one hour average in saltwater should be adopted as the standards for all fresh and saltwater classes except D and SD. The criteria proposed not to be exceeded at any time should be adopted as the standards for classes D and SD.

Fact Sheet Date: March 12, 1998

NEW YORK STATE
- AQUATIC FACT SHEET -

Ambient Water Quality Value
for Protection of Aquatic Life

SUBSTANCE: Cyanide **CAS REGISTRY NUMBER:** Not Applicable

TYPE:	BASIS:	FRESHWATER AMBIENT WATER QUALITY VALUE (ug/L):
Acute	Survival	22*

REMARK: * Applies to free cyanide ($HCN + CN^-$) as CN

INTRODUCTION

This value applies to the water column and is derived to protect aquatic life from the effects of waterborne contaminants. 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 an acute aquatic life criterion for cyanide for the Great Lakes Water Quality Initiative (GLI). The Department has reviewed this criterion and determined that it is based on appropriate data and derived according to the scientific procedures in current and proposed 6 NYCRR Part 702. It is thus determined to be an appropriate ambient water quality value for protection of aquatic life for New York State.

The attachment to this fact sheet provides U.S. EPA's derivation of the value. U.S. EPA's Criterion Maximum Concentration (CMC) is equivalent to New York's Aquatic (Acute) value.

The reader will note that the attachment also derives a Criterion Continuous Concentration (CCC), equivalent to a NYS Aquatic (Chronic) value. This fact sheet does not present that value because New York has an existing standard for protection of propagation for cyanide that is described in a separate fact sheet.

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 7, 1997

ATTACHMENT

GREAT LAKES WATER QUALITY INITIATIVE

Tier 1 Aquatic Life Criterion for Cyanide

No new acceptable acute or chronic data were found for cyanide. Therefore, the data in the existing criteria document for cyanide (U.S. EPA 1985) were used as the basis for the derivation of this criterion. The new taxonomy for salmonids was used (Table F1), but this did not cause a change in the criterion for cyanide.

Criterion Maximum Concentration (CMC)

The Final Acute Value (FAV) was calculated using the four lowest Genus Mean Acute Values given in Table F1, resulting in a FAV of 45.77 ug/L. Because the SMAV of the commercially and recreationally important rainbow trout was 44.73 ug/L, the FAV was lowered to 44.73 ug/L. The CMC was calculated by dividing the FAV by 2, resulting in a CMC of 22.36 ug free cyanide (as CN)/L.

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). Five SMACRs are available (Table F1), but one was a high SMACR that was obtained with a resistant species; the other four were within a factor of 1.5. The FACR was calculated as the geometric mean of these four and was 8.568. The FCV = FAV/FACR = (44.73 ug/L)/(8.568) = 5.221 ug/L. This value does not need to be lowered to protect a commercially or recreationally important species of the Great Lakes System. The CCC was 5.221 ug free cyanide (as CN)/L.

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 free cyanide (as CN) does not exceed 5.221 ug/L more than once every three years on the average and if the one-hour average concentration does not exceed 22.36 ug/L more than once every three years on the average.

Table F1. Ranked Genus Mean Acute Values for Cyanide

Rank*	Genus Mean Acute Value (ug/L)	Species	Species Mean Acute Value (ug/L)	Species Mean Acute-Chronic Ratio
16	2490	Midge, Tanytarsus dissimilis	2490	-----
15	2326	Isopod, Asellus communis	2326	68.29**
14	432	Snail, Physa heterostropha	432	-----
13	426	Stonefly, Pteronarcys dorsata	426	-----
12	318	Goldfish, Carassius Auratus	318	-----
11	167	Amphipod, Gammarus pseudolimnaeus	167	9.111
10	147	Guppy, Poecilia reticulata	147	-----
9	125.1	Fathead minnow, Pimephales promelas	125.1	7.633
8	123.6	Cladoceran, Daphnia magna	160	-----
		Cladoceran, Daphnia pulex	95.55	-----
7	102	Largemouth bass, Micropterus salmoides	102	-----
6	102	Black crappie, Pomoxis nigromaculatus	102	-----
5	99.28	Bluegill, Lepomis macrochirus	99.28	7.316
4	92.64	Yellow perch, Perca flavescens	92.64	-----
3	90.00	Atlantic salmon, Salmo salar	90.00	-----

Table F1. (Cont.)

Rank*	Genus Mean Acute Value (ug/L)	Species	Species Mean Acute Value (ug/L)	Species Mean Acute-Chronic Ratio
2	85.80	Brook trout, Salvelinus fontinalis	85.80	10.59
1	44.73	Rainbow trout Oncorhynchus mykiss	44.73	-----

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

Calculated FAV = 45.77 ug/L

Lowered to protect rainbow trout:

FAV = 44.73 ug/L

CMC = FAV/2 = 22.36 ug/L

FACR = 8.568

FCV = FAV/FACR = (44.73 ug/L)/(8.568) = 5.221 ug/L = CCC

References

U.S. EPA. 1985. Ambient Water Quality Criteria for Cyanide - 1984. EPA 440/5-84-028. National Technical Information Service, Springfield, VA.