Fact Sheet Date: June 1998

NEW YORK STATE
- AQUATIC FACT SHEET -

Ambient Water Quality Value
For Protection of Aquatic Life

SUBSTANCE: Acenaphthene **CAS REGISTRY NUMBER:** 83-32-9

TYPE:	BASIS:	Ambient Water Quality Value, ug/L FRESHWATER	SALTWATER
Chronic	Propagation	5.3	6.6
Acute	Survival	48	60

INTRODUCTION

These values apply to the water column and are derived 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

The U.S. EPA AQUIRE (**AQU**uatic toxicity **I**nformation **R**etreival System)(U.S. EPA, 1993) was searched for toxicity data on acenaphthene with EC_{50} or LC_{50} toxicity endpoints. The initial search identified 39 toxicity test records. From that original group, only data with a documentation code of C (Complete methods and results documentation), and 96 hour LC_{50} or 48 hour EC_{50} endpoints were selected. If both flow-through and static test toxicity data were available for the same species, only flow-through data was used. Static toxicity test data was used only if flow-through data was not available. This second screening resulted in a final acute toxicity database for acenaphthene of five studies with five freshwater species and two studies with one marine species. Species Mean Acute Values (SMAVs) were determined from the acceptable acenaphthene toxicity studies obtained from the AQUIRE database. Ambient water quality guidance values were then calculated in accordance with 6NYCRR Part 706.1.

DERIVATION OF ACUTE VALUES

As shown in Table 1, data are available for five of the eight families necessary to derive a Tier 1 freshwater value. Consequently, the data from the five families are used to derive a Tier 2 freshwater value. Similarly, Table 2 shows that data are available for one of the eight families necessary to derive a Tier 1 saltwater value, so those data are used to derive a Tier 2 saltwater value.

Table 1. Freshwater toxicity data used to derive the acenaphthene acute value. When only an SMAV is listed, the SMAV was the LC_{50} of the test species indicated. NDA means no data was available.

Data Requirement	Species	LC_{50} ug/L	SMAV ug/L	References
Family Salmonidae	Brown trout		580	10417
A second Family in the Class Osteichthyes	Fathead minnow	608	1189.48	15152
		1600		10417
		1730		12447
A third family from the phylum Chordata	Bluegill		1700	5590
A planktonic crustacean	Daphnia magna		3450	2193
A benthic crustacean	NDA			
An insect	NDA			
A family in a phylum other than Arthropoda or Chordata	snail		>2040	10417
A family in any order of insect or any other phylum not already represented	NDA			

The lowest SMAV was divided by the SAF to determine the secondary acute value (SAV). Because five data requirements were met, a secondary acute factor (SAF) of 6.1 is required. The Tier II value was determined by dividing the SAV by two and rounding to two significant digits.

SAV = 580 / 6.1 = 95.0820 ug/L
Freshwater Tier II A(A) value = 95.0820 ug/L / 2 = 47.5410 ug/L ≈ 48 ug/L

Table 2. Saltwater toxicity data used to derive the acenaphthene acute value. When only an SMAV is listed, the SMAV was the LC_{50} of the test species indicated. NDA means no data was available.

Data Requirement	Species	LC_{50} ug/L	SMAV ug/L	References
A family from the phylum Chordata	Sheepshead minnow	3100	2611.5	9953
		2200		10366
A second family from the Phylum Chordata	NDA			
A family in a phylum other than Arthropoda or Chordata	NDA			
Either the Mysidae or Penaeidae family	NDA			
Three other families not in the family Chordata; may include Mysidae or Penaeidae, which ever was not used above	NDA			
	NDA			
	NDA			
Any other family	NDA			

Because one data requirement was met, a secondary acute factor (SAF) of 21.9 is required.

SAV = 2611.5 / 21.9 = 119.2466 ug/L
Saltwater Tier II A(A) value = 119.2466 / 2 = 59.6233 ug/L ≈ 60 ug/L

DERIVATION OF CHRONIC VALUES

The secondary chronic value (SCV) is determined by dividing the SAV by the secondary acute to chronic ratio (SACR). The Tier II A(C) value is equal to the SCV. A species acute to chronic ratio (ACR) is an acute LC_{50} divided by a chronic value for the same species. The chronic value is the geometric mean of the NOEC (No Observed Effects Concentration) and LOEC (Lowest Observed Effects Concentration) values. A minimum of three species ACRs are required to derive a SACR. If three species ACRs are not available, 6NYCRR Part 706.1 requires that a species ACR value of 18 should

be substituted for each missing species ACR. The SACR is equal to the cube root of the product of the three species ACRs. Both saltwater and freshwater species data are used to derive a common SACR. No studies could be found in the AQUIRE database that provided adequate acute and chronic data to determine an acute to chronic ratio as required by 6NYCRR Part 706.1 so the SCV was determined by dividing the SAV by a SACR of 18.

The freshwater SCV = 95.0820 ug/L / 18 = 5.2823 ug/L
Freshwater Tier II A(C) value =5.2823 ≈ 5.3 ug/L

The saltwater SCV = 119.2466 ug/L / 18 = 6.6248 ug/L
Saltwater Tier II A(C) value = 6.6248 ≈ 6.6 ug/L

REFERENCES

U.S. EPA 1993. AQUIRE, AQUatic toxicity Information Retrieval Database, Technical Support Document. U.S. EPA Environmental Research Laboratory, Office of Research and Development, Duluth, Minnesota, September, 1993.

AQUIRE DATA CITATIONS

REFERENCE NUMBER: 2193
Randall,T.L. and P.V.Knopp, 1980. Detoxification of Specific Organic Substances by Wet Oxidation. J. Water Pollut. Control Fed. 52(8):2117-2130

REFERENCE NUMBER: 5590
Buccafusco,R.J., S.J.Ells, and G.A.LeBlanc, 1981. Acute Toxicity of Priority Pollutants to Bluegill (Lepomis macrochirus) Bull. Environ. Contam. Toxicol. 26(4):446-452

REFERENCE NUMBER: 9953
Ward,G.S., P.R.Parrish, and R.A.Rigby, 1981. Early Life Stage Toxicity Tests with a Saltwater Fish: Effects of Eight Chemicals on Survival, Growth, and Development of Sheepshead Minnows. J. Toxicol. Environ. Health 8(1-2):225-240

REFERENCE NUMBER: 10366
Heitmuller,P.T., T.A.Hollister, and P.R.Parrish, 1981. Acute Toxicity of 54 Industrial Chemicals to Sheepshead Minnows (Cyprinodon variegatus) Bull. Environ. Contam. Toxicol. 27(5):596-604

REFERENCE NUMBER: 10417
Holcombe,G.W., G.L.Phipps, and J.T.Fiandt, 1983. Toxicity of Selected Priority Pollutants to Various Aquatic Organisms. Ecotoxicol. Environ. Saf. 7(4):400-409

REFERENCE NUMBER: 12447
Geiger,D.L., C.E.Northcott, D.J.Call, and L.T.Brooke, 1985. Acute Toxicities of Organic Chemicals to Fathead Minnows (Pimephales promelas), Vol. 2. Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI:326 p.

REFERENCE NUMBER: 15152
Cairns,M.A. and A.V.Nebeker, 1982. Toxicity of Acenaphthene and Isophorone to Early Stages of Fathead Minnows. Arch. Environ. Contam. Toxicol. 11(6):703-707

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