Fact Sheet Date: June 1998

NEW YORK STATE
- AQUATIC FACT SHEET -

Ambient Water Quality Value
For Protection of Aquatic Life

SUBSTANCE: Anthracene **CAS REGISTRY NUMBER:** 120-12-7

TYPE:	BASIS:	Freshwater Ambient Water Quality Value, ug/L:
Chronic	Propagation	3.8
Acute	Survival	35

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 anthracene with EC_{50} or LC_{50} toxicity endpoints. The initial search identified 48 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 anthracene of two studies with two freshwater species. No acceptable studies for marine species were found. Species Mean Acute Values (SMAVs) were determined from the acceptable anthracene 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 one of the eight families necessary to derive a Tier 1 freshwater value. Consequently, the data from the one family are used to derive a Tier 2 freshwater value. No suitable marine data was found, so saltwater values for anthracene could not be determined.

Table 1. Freshwater toxicity data used to derive the anthracene 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. For anthracene, a genus mean acute value (GMAV) was calculated for the two Daphnia spp.

Data Requirement	Species	SMAV ug/L	GMAV ug/L	References
Family Salmonidae	NDA			
A second Family in the Class Osteichthyes	NDA			
A third family from the phylum Chordata	NDA			
A planktonic crustacean	Daphnia magna	3029.91	1511.47	11936
	Daphnia pulex	754		3283
A benthic crustacean	NDA			
An insect	NDA			
A family in a phylum other than Arthropoda or Chordata	NDA			
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 one data requirement was met, a secondary acute factor (SAF) of 21.9 was selected. The Tier II guidance value was determined by dividing the SAV by two and rounding to two significant digits.

SAV = 1511.47 / 21.9 = 69.0169 ug/L
Freshwater Tier II A(A) value = 69.0169 ug/L / 2 = 34.5085 ≈ 35 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 = 69.0169 ug/L / 18 = 3.8343 ug/L
Freshwater Tier II A(C) value = 3.8343 ug/L ≈ 3.8 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: 3283
Smith,S.B., J.F.Savino, and M.A.Blouin, 1988. Acute Toxicity to Daphnia pulex of Six Classes of Chemical Compounds Potentially Hazardous to Great Lakes Aquatic Biota. J. Great Lakes Res. 14(4):394-404; Aquat. Sci. Fish. Abstr. 17(2):139 (1987)

REFERENCE NUMBER: 11936
Bobra,A.M., W.Y.Shiu, and D.MacKay, 1983. A Predictive Correlation for the Acute Toxicity of Hydrocarbons and Chlorinated Hydrocarbons to the Water Flea (Daphnia magna). Chemosphere 12(9-10):1121-1129

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