

Fact Sheet Date: June 1998

**NEW YORK STATE
- AQUATIC FACT SHEET -**

**Ambient Water Quality Values
For Protection of Aquatic Life**

SUBSTANCE: Ethylbenzene

CAS REGISTRY NUMBER: 100-41-4

TYPE:	BASIS:	Ambient Water Quality Value, ug/L	
		FRESHWATER	SALTWATER
Chronic	Propagation	17	4.5
Acute	Survival	150	41

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 (AQUatic toxicity Information Retrieval System)(U.S. EPA, 1993) was searched for toxicity data on ethylbenzene with EC₅₀ or LC₅₀ toxicity endpoints. The initial search identified 81 toxicity test records. From that original group, only data with a documentation code of C (Complete methods and results documentation), and 96 hour LC₅₀ or 48 hour EC₅₀ 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 ethylbenzene of six studies with four freshwater species and four studies with six marine species. Species Mean Acute Values (SMAVs) were determined from the acceptable ethylbenzene 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 four of the eight families necessary to derive a Tier 1 freshwater value. Consequently, the data from the four families are used to derive a Tier 2 freshwater value. Similarly, Table 2 shows that data are available for six 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 ethylbenzene acute value. When only an SMAV is listed, the SMAV was the LC₅₀ of the test species indicated. NDA means no data was available.

Data Requirement	Species	LC ₅₀ ug/L	SMAV ug/L	References
Family Salmonidae	Rainbow trout		14000	666
A second Family in the Class Osteichthyes	Bluegill sunfish	88000	75031.1	666
		32000		728
		150000		5590
A third family from the phylum Chordata	Fathead minnow	9090	10487.6	3217
		12100		12858
A planktonic crustacean	<u>Daphnia magna</u>		2124	11936
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 appropriate secondary acute factor (SAF) to determine the secondary acute value (SAV). Because four data requirements were met, a secondary acute factor (SAF) of 7.0 is required. The Tier II value was

determined by dividing the SAV by two, and rounding to two significant digits.

$$\text{SAV} = 2124 / 7.0 = 303.4286 \text{ ug/L}$$

$$\text{Freshwater Tier II A(A) value} = 303.4286 \text{ ug/L} / 2 = 151.7143 \approx 150 \text{ ug/L}$$

Table 2. Saltwater toxicity data used to derive the ethylbenzene acute value. When only an SMAV is listed, the SMAV was the LC₅₀ of the test species indicated. NDA means no data was available.

Data Requirement	Species	SMAV, ug/L	References
A family from the phylum Chordata	Striped Bass	3729	558
A second family from the Phylum Chordata	Atlantic silversides	5100	4189
A family in a phylum other than Arthropoda or Chordata	Pacific oyster	1026765	8621
Either the Mysidae or Penaeidae family	Opossum shrimp	2600	4189
Three other families not in the family Chordata; may include Mysidae or Penaeidae, which ever was not used above	Bay shrimp	424.9280	558
	Dungeness crab	1300	5035
	NDA		
Any other family	NDA		

Because six data requirements were met, a secondary acute factor (SAF) of 5.2 is required.

$$\text{SAV} = 424.9280 \text{ ug/L} / 5.2 = 81.7169 \text{ ug/L}$$

$$\text{Saltwater Tier II A(A) value} = 81.7169 \text{ ug/L} / 2 = 40.8585 \approx 41 \text{ ug/L}$$

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 LC₅₀ 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 = $303.4286 \text{ ug/L} / 18 = 16.8571 \text{ ug/L}$
Freshwater Tier II A(C) guidance value = $16.8571 \approx 17 \text{ ug/L}$.

The saltwater SCV = $81.7169 \text{ ug/L} / 18 = 4.5398 \text{ ug/L}$
Saltwater Tier II A(C) = $4.5398 \approx 4.5 \text{ ug/L}$.

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DFWMR/ts/2-98