

Fact Sheet Date: June 1998

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

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

**SUBSTANCE:** Toluene

**CAS REGISTRY NUMBER:** 108-88-3

<b>TYPE:</b>	<b>BASIS:</b>	<b>Ambient Water Quality Value, ug/L</b>	
		<b>FRESHWATER</b>	<b>SALTWATER</b>
Chronic	Propagation	100	92
Acute	Survival	480	430

**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 toluene with EC<sub>50</sub> or LC<sub>50</sub> toxicity endpoints. The initial search identified 158 toxicity test records. From that original group, only data with a documentation code of C (Complete methods and results documentation), and 96 hour LC<sub>50</sub> or 48 hour EC<sub>50</sub> 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 toluene of six studies with four freshwater species and seven studies with seven marine species. Species Mean Acute Values (SMAVs) were determined from the acceptable toluene 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 seven 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 toluene acute value. When only an SMAV is listed, the SMAV was the LC<sub>50</sub> of the test species indicated. NDA means no data was available.

Data Requirement	Species	LC <sub>50</sub> ug/L	SMAV ug/L	References
Family Salmonidae	Rainbow trout		6780	17137
A second Family in the Class Osteichthyes	Bluegill sunfish	24000	17663.5	728
		13000		5590
A third family from the phylum Chordata	Goldfish		22800	416
A planktonic crustacean	<u>Daphnia magna</u>	19600	15021.5	5087
		11512.5		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.

$$\text{SAV} = 6780 / 7.0 = 968.5714 \text{ ug/L}$$

$$\text{Freshwater Tier II A(A)} = 968.5714 \text{ ug/L} / 2 = 484.2857 \approx 480 \text{ ug/L}$$

Table 2. Saltwater toxicity data used to derive the toluene acute value. When only an SMAV is listed, the SMAV was the LC<sub>50</sub> 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	6328	558
A second family from the Phylum Chordata	Pink salmon	7341	5030
A family in a phylum other than Arthropoda or Chordata	Pacific oyster	1047000	8621
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	Bay shrimp	3727.67	558
	Daggerblade grass shrimp	9500	420
	Dungeness crab	28000	5035
Any other family	Eualus spp.	18522	5030

Because four data requirements were met, a secondary acute factor (SAF) of 4.3 is required.

$$\text{SAV} = 3727.67 \text{ ug/L} / 4.3 = 866.90 \text{ ug/L}$$

$$\text{Saltwater Tier II A(A)} = \text{SAV} / 2 = 866.90 \text{ ug/L} / 2 = 433.450 \approx 430 \text{ ug/L}$$

#### 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 LC<sub>50</sub> 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. Only one study was identified that provided adequate acute and chronic toxicity data as required in 6NYCRR Part 706.1 for deriving a species acute to chronic ratio (Table 3).

Species	Acute value, ug/L	Chronic NOEC, ug/L	Chronic LOEC, ug/L	Chronic Value, ug/L	Study Reference No.
Fathead minnow	17030	5440	8040	6613.4409	3910

Fathead minnow ACR =  $17030 / 6613.4409 = 2.5751$

SACR =  $(18 * 18 * 2.5751) = 833.0040$ ;  $\sqrt[3]{833.0040} = 9.4091$

The freshwater SCV =  $968.5714 \text{ ug/L} / 9.4091 = 102.9396 \text{ ug/L}$   
 Freshwater Tier II A(C) =  $102.9396 \approx 100 \text{ ug/L}$

The saltwater SCV =  $866.90 \text{ ug/L} / 9.4091 = 92.1340 \text{ ug/L}$   
 The Tier II A(C) for saltwater =  $92.1340 \text{ ug/L} \approx 48 \text{ ug/L}$

## REFERENCES

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