

TIER II ACUTE AND CHRONIC AQUATIC LIFE VALUES FOR CHLOROFORM

Standard:

The procedures described in the Tier II methodology indicate that, except possibly where a locally important species is very sensitive, aquatic organisms should not be affected unacceptably if the four (4) day average concentration of chloroform does not exceed 171 µg/L more than once every three (3) years on the average and if the one (1) hour average concentration does not exceed 1286 µg/L more than once every three (3) years on the average.

Calculations:

Acute Aquatic Life:

$$\text{SAV} = \text{lowest GMAV/SAF}$$

$$\text{Lowest GMAV} = 18,000 \text{ } \mu\text{g/L}$$

$$\text{SAF} = 7.0$$

$$\text{SAV} = 18,000/7.0 = 2571 \text{ } \mu\text{g/L}$$

$$\text{SMC} = \text{SAV}/2 = 2571/2 = \mathbf{1286 \text{ } \mu\text{g/L}}$$

Chronic Aquatic Life:

$$\text{SCV} = \text{SAV/SACR}$$

$$\text{SACR} = 15 \text{ (Geometric mean of 18, 18, 11)}$$

$$\text{SCV} = 2571 / 15 = \mathbf{171 \text{ } \mu\text{g/L}}$$

Calculation of ACR's

Daphnia magna

$$\text{NOEC} = 1800 \text{ } \mu\text{g/L}$$

$$\text{LOEC} = 3600 \text{ } \mu\text{g/L}$$

$$\text{CV} = \text{Geometric Mean of 1800 and 3600} = 2546$$

$$\text{ACR} = 29000/2546 = 11$$

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Notes:

There exists a huge discrepancy between the two available studies on the acute toxicity of chloroform to Daphnia magna. The highest value (758 mg/L) was greater than 10X the next lowest value (66.8 mg/L). The highest value was dropped as an outlier. This did not affect the SAV or SMC values.

Table 1. GMAVs and SMAVs for chloroform

<u>Genus Mean Acute Value (µg/L)</u>	<u>Species</u>	<u>Species Mean Acute Value (µg/L)</u>	<u>Acute- Chronic Ratio</u>	<u>Reference Number</u>
18,000	Bluegill <u>Lepomis macrochirus</u>	18,000	1	
51,000	Largemouth Bass <u>Micropterus salmoides</u>	51,000	1	
103,000	Fathead Minnow <u>Pimephales promelas</u>	103,000		4
75,000	Channel Catfish <u>Ictalurus punctatus</u>	75,000	1	
18,000	Rainbow Trout <u>Oncorhynchus mykiss</u>	18,000	1	
53,540	Cladoceran <u>Daphnia magna</u>	53,540	11	2,3

References:

1. Anderson, D.R. and E.B. Lusty 1980. Acute toxicity and bioaccumulation of chloroform to four species of freshwater fish: 'Salmo gaidneri,' rainbow trout, 'Lepomis macrochirus,' Bluegill, 'Micropterus salmoides,' largemouth bass, 'Ictalurus punctatus,' channel catfish. Battelle Pacific Northwest Labs. Richland, WA.
2. Gersich, F.M., F.A. Blanchard, S.L. Applegath 1986. The precision of daphnid (Daphnia magna Straus, 1820) static acute toxicity tests. Arch. Environ. Contam. Toxicol. 15: 741-749.
3. LeBlanc, G.A. 1980. Acute toxicity of priority pollutants to Daphnia magna. Bull. Environ. Contam. Toxicol. 24(5): 684-691.
4. Mayes, M.A., H.C. Alexander, and D.C. Dill 1983. A study to assess the influence of age on the response of fathead minnows in static acute toxicity tests.

References not used:

1. Qureshi, A.A., K.W. Flood, S.R. Thompson 1982. Comparison of a luminescent bacterial test with other bioassays for determining toxicity of pure compounds and complex effluents. In: J.G. Pearson, R.B. Foster and W.E. Bishop (Eds.). Aquatic Toxicology and Hazard Assessment, 5th Conference. AST 766, Philadelphia, P.A. pp. 179-195.

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