Indiana Department of Environmental Management
Office of Water Quality - Water Quality Standards Section

TIER II ACUTE AND CHRONIC AQUATIC LIFE VALUES

VANADIUM

CAS RN: 7440-62-2
Water Solubility:
Log K_{ow}:

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 vanadium does not exceed 12 µg/L more than once every three (3) years on the average and if the one (1) hour average concentration does not exceed 110 µg/L more than once every three (3) years on the average.

Calculations

Acute Aquatic Life:

SAV = lowest GMAV/SAF

Lowest GMAV = 1,519 µg/L
SAF = 7.0

SAV = 1,519/7.0 = 217 µg/L

SMC = SAV/2 = 217/2 = **110 µg/L**

Chronic Aquatic Life:

SCV = SAV/SACR

SACR = 18

SCV = 217/18 = **12 μg/L**

Notes

Cowgill et al. (1985) was not used since the data obtained in this study varied by greater than 10 from Pillard (1995) and ancillary information from another study.

Data

Table 1. GMAVs and SMAVs for vanadium

Genus Mean Acute Value (μg/L)	Species	Species Mean Acute Value (μg/L)	Acute-Chronic Ratio	Reference Number
1,519	Cladoceran Daphnia magna	1,580		1
	Cladoceran Daphnia magna	1,460		1
3,903	Bonytail Chub Gila elegans	5,300	2	
	Bonytail Chub Gila elegans	2,200	2	
	Bonytail Chub Gila elegans	5,100	2	
4,727	Razorback Sucker Xyrauchen texanus	8,800		2
	Razorback Sucker Xyrauchen texanus	4,000		2

	Razorback Sucker Xyrauchen texanus	3,000	2
5,033	Colorado Squawfish Pychocheilus lucius	7,800	2
	Colorado Squawfish Pychocheilus lucius	3,800	2
	Colorado Squawfish Pychocheilus lucius	4,300	2
10,247	Brook Trout Salvelinus fontinalis	7,000	3
	Brook Trout Salvelinus fontinalis	15,000	3
16,500	Chinook Salmon Oncorhynchus tschawytscha	16,500	4
	Rainbow Trout Oncorhynchus mykiss	7,925	5

References

1. Alexander, H.C., W.M. McCarty and E.A. Bartlett 1978. Toxicity of perchloroethylene, trichloroethylene, 1,1,1-trichloroethane and methylene chloride to fathead minnows. Bull. Environ. Contam. Toxicol. 20: 334-352.

2. Buccafusco, R.J., S.J. Ells, and G.A. LeBlanc 1981. Acute toxicity of priority pollutants to bluegill (Lepomis macrochirus). Bull. Environ. Contam. Toxicol. 24(5): 446-452.

3. Canton, H., and D.M.M. Adema 1978. Reproducibility of short-term and reproduction toxicity experiments with Daphnia magna and comparison of the sensitivity of Daphnia magna with Daphnia pulex and Daphnia cucullata in short-term experiments. Hydrobiologia 59(2): 135-140.

4. LeBlanc, G.A. 1980. Acute toxicity of priority pollutants to water flea (Daphnia magna). Bull Environ. Contam. Toxicol. 24(5): 684-691.

5. Sloof, W. 1983. Benthic macroinvertebrates and water quality assessment. Some toxicological considerations. Aquatic Toxicol. 4: 73-82.

6. Smith, A.D., A. Bharath, C. Mallard 1991. The acute and chronic toxicity of ten chlorinated organic compounds to the American Flagfish (Jordanella floridae). Arch. Environ. Toxicol. 20: 94-102.

7. Veith, G., D.J. Call, L.T. Brodie 1983. Structure-toxicity relationships for the fathead minnow, Pimephales promelas: Narcotic industrial chemicals. Can. J. Fish. Aq. Sci. 40(6): 743-748.

Acronyms/Abbreviations

CAS RN	Chemical Abstract Service Registry Number
K_{ow}	Octanol-Water Partition Coefficient
P (superscript)	Predicted value
SAV	Secondary Acute Value
GMAV	Genus Mean Acute Value
SAF	Secondary Acute Factor
SMC	Secondary Maximum Concentration
SCC	Secondary Continuous Concentration
SACR	Secondary Acute-Chronic Ratio
FT	Flow-through
S	Static
U	Unmeasured
M	Measured
EVISTRA	Evaluation and Interpretation of Suitable Test Results in AQUIRE (EPA quality checking method/database)

Revision History

February 24, 1999 Values first developed
September 21, 2001 New search for data. No studies added.

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