



TIER II ACUTE AND CHRONIC AQUATIC LIFE VALUES
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BORON

CAS RN: 7440-42-8

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 boron does not exceed 1,600 µg/L more than once every three (3) years on the average and if the one (1) hour average concentration does not exceed 10,000 µg/L more than once every three (3) years on the average.

Calculations

Acute Aquatic Life:

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

$$\begin{aligned}\text{Lowest GMAV} &= 108,145 \text{ } \mu\text{g/L} \\ \text{SAF} &= 5.2\end{aligned}$$

$$\text{SAV} = 108,145/5.2 = 20,797 \text{ } \mu\text{g/L}$$

$$\text{SMC} = \text{SAV}/2 = 20,797/2 = \mathbf{10,000 \text{ } \mu\text{g/L}}$$

Chronic Aquatic Life:

$$SCC = SAV/SACR$$

$$SACR = 13.02 \text{ (geometric mean of 18, 18, 6.812)}$$

$$SCC = 20,797/13.02 = \mathbf{1,600 \text{ } \mu\text{g/L}}$$

Data

Table 1. GMAVs and SMAVs for boron

<u>Genus Mean Acute Value ($\mu\text{g/L}$)</u>	<u>Species</u>	<u>Species Mean Acute Value ($\mu\text{g/L}$)</u>	<u>Acute- Chronic Ratio</u>	<u>Reference Number</u>
108,145	Cladoceran <u>Daphnia magna</u>	141,000		1
	Cladoceran <u>Daphnia magna</u>	133,000	14.30	2
	Cladoceran <u>Daphnia magna</u>	139,200	7.694	3
	Cladoceran <u>Daphnia magna</u>	52,400	2.873	3
136,725	Midge <u>Chironomous tentans</u>	118,000		3
	Midge <u>Chironomous tentans</u>	137,700		3
	Midge <u>Chironomous tentans</u>	157,300		3
311,733	Amphipod <u>Hyaella azteca</u>	291,300		3
	Amphipod	333,600		3

	<u>Hyalella azteca</u>		
552,000	Bonytail <u>Gila elegans</u>	552,000	4
390,186	Coho Salmon <u>Oncorhynchus kisutch</u>	447,000	5
	Coho Salmon <u>Oncorhynchus kisutch</u>	304,100	3
	Coho Salmon <u>Oncorhynchus kisutch</u>	477,100	3
	Coho Salmon <u>Oncorhynchus kisutch</u>	357,400	3
421,252	Chinook Salmon <u>Oncorhynchus tshawytscha</u>	566,000	5
	Chinook Salmon <u>Oncorhynchus tshawytscha</u>	379,600	3
	Chinook Salmon <u>Oncorhynchus tshawytscha</u>	336,000	3
	Chinook Salmon <u>Oncorhynchus tshawytscha</u>	436,200	3
381,754	Rainbow Trout <u>Oncorhynchus mykiss</u>	379,600	3
	Rainbow Trout <u>Oncorhynchus mykiss</u>	336,000	3
	Rainbow Trout <u>Oncorhynchus mykiss</u>	436,200	3
383,449	Colorado Squawfish	279,000	4

	<u>Ptychocheilus lucius</u>		
	Colorado Squawfish	527,000	4
	<u>Ptychocheilus lucius</u>		
254,965	Razorback sucker	233,000	4
	<u>Xyrauchen texanus</u>		
	Razorback sucker	279,000	4
	<u>Xyrauchen texanus</u>		

References

1. Maier, K.J. and A.W. Knight 1991. The toxicity of waterborne boron to *Daphnia magna* and *Chironomus decorus* and the effects of hardness and sulfate on boron toxicity. Arch. Environ. Contam. Toxicol. 20: 282-287.
2. Gersich, F.M. 1984. Evaluation of a static renewal chronic toxicity test method for *Daphnia magna* Straus using boric acid. Environ. Toxicol. Chem. 3: 89-94.
3. Moss, S.A. and N.K. Nagpal 2003. Ambient Water Quality Guidelines for Boron. Water Protection Section, Ministry of Water, Land and Air Protection. British Columbia. (report containing MELP unpublished data)
4. Hamilton, S.J. 1995. Hazard assessment of inorganics to three endangered fish in the Green River, Utah. Ecotoxicol. Environ. Saf. 30: 134-142.
5. Hamilton, S.J. and K.J. Buhl 1990. Acute toxicity of boron, molybdenum and selenium to fry of Chinook salmon and coho salmon. Arch. Environ. Contam. Toxicol. 19: 366-373.

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

May 28, 1997 Values first developed
August 23, 2000 New search for data. No new studies added.
August 12, 2004 Criteria updated with new data

Contact Information

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