MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
HUMAN & WILDLIFE TOXICITY SUMMARY

Chemical Name:	Boron	CAS No.:	7440-42-8
Derived By:	D. Bush	Literature Review Date:	7/18/12
Reviewed By:	-	Verification Date:	9/1/12

	Drinking Water	Nondrinking Water
Surface Water		
HNV (Tier 1)	4,000 ug/L	330,000 ug/L
HCV (Tier 1)	NA	NA
Screening Level		
Ground Water		
GW Noncancer		
GW Cancer		

HUMAN HEALTH INTERMEDIATE VALUES:

ADE (RfD)	0.1455 mg/kg/d
POTENCY	
HH-BAF-TL$_3$	1.0 L/kg
HH-BAF-TL$_4$	1.0 L/kg

WV	NA
WV-BAF-TL$_3$	
WV-BAF-TL$_4$	

Comments:

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
HUMAN NONCANCER VALUE WORKSHEET

Chemical Name:	Boron	CAS No.:	7440-42-8
Developed By:	D. Bush	Literature Search Date:	7/18/2012
Reviewed By:	–	Verification Date:	9/1/2012

Key Study: Price et al. (1996) identified a NOAEL of 9.6 mg boron/kg body weight/d in CD rats exposed to boric acid via their diet from gestation day 0-20. A decrease in fetal body weight occurred at a dose of 13.3 mg/kg body weight/d.

ADE = 0.1455 mg/kg/d

$$ADE = \frac{9.6\ mg/kg/d}{66}$$

Where UF = 10.43 (3.3 x 3.16) for interspecies extrapolation and 6.32 (2 x 3.16) for intraspecies extrapolation. See the discussion of the RfD for boron provided in the IRIS database for details on the derivation of the uncertainty factors.

drinking water

$$HNV = \frac{(0.1455\ mg/kg/d) \times (70\ kg) \times (0.8)}{(2\ L/d) + (0.0036\ kg/d \times 1.0\ L/kg) + (0.0114\ kg/d \times 1.0\ L/kg)} = 4{,}043.67\ ug/L$$

HNV for drinking water = 4,000 ug/L

non-drinking water

$$HNV = \frac{(0.1455\ mg/kg/d) \times (70\ kg) \times (0.8)}{(0.01\ L/d) + (0.0036\ kg/d \times 1.0\ L/kg) + (0.0114\ kg/d \times 1.0\ L/kg)} = 325{,}920.0000\ ug/L$$

HNV for non-drinking water = 330,000 ug/L

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
BIOACCUMULATION FACTOR WORKSHEET

Chemical Name: Boron
CAS No. 7440-42-8
BAF Derived By: D. Bush
Literature Review Date: 7/18/2012
BAF Reviewed By: —
Verification Date: 9/1/2012

HH-BAF-TL.3: 1.0 L/kg
WL-BAF-TL.3:
HH-BAF-TL.4: 1.0 L/kg
WL-BAF-TL.4:

I. FIELD BAFs, BSAFs, or LABORATORY BCFs

Ref #	BAF, BSAF, or BCF	Value	Species	Exposure Duration (days)	Tissue Type	Tissue Lipid (%)	Steady State Tissue Conc.	Water or Sed. (BSAF) Conc.
1.)	BCF	< 1.0	salmon	21	muscle	NA	8 mg/kg	10 mg/L
2.)	BAF	*	cyprinids	NA	muscle	NA	< DL	0.13 mg/L

* A BAF could not be calculated because boron was not found above the detection level (dl).

Final BAF: Insufficient laboratory or field studies are available for determining a BAF for boron.
Justification: Even though reference #1 was conducted in saltwater and reference #2 did not provide the detection level of boron in fish, both studies suggest that a BAF of 1.0 would be appropriate.

II. LOG Kow VALUES

Ref #	Meas./Calc. Log Kow	Method	Value	Meas./Calc. Log Kow	Method	Value

Final Log Kow:
Justification:

Food Chain Multipliers
FCM-TL.3:
FCM-TL.4:

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
BIOACCUMULATION FACTOR CALCULATIONS

Assessment/Calculations:

The Bioaccumulation Factor for trophic level 3 and trophic level 4 fish is 1.0.

References:

1.) Thompson, J.A. and J.C. Davis. 1976. Toxicity, uptake and survey studies of boron in the marine environment. Water Res. 10:869-875.

2.) Uysal, K., E. Kose, M. Bulbul, M. Donmez, Y. Erdogan, M. Koyun, C. Omeroglu, and F. Ozmal. 2009. The comparison of heavy metal accumulation ratios of some fish species in Enne Dame Lake (Kutahya/Turkey). Environ. Monit. Assess. 157:355-362.