



## CHEMICAL UPDATE WORKSHEET

<b>Chemical Name:</b>	<b>Bromodichloromethane (DD)</b>
<b>CAS #:</b>	<b>75-27-4</b>
<b>Revised By:</b>	RRD Toxicology Unit
<b>Revision Date:</b>	November 18, 2015

### (A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
<b>Molecular Weight (g/mol)</b>	163.8	163.83	EPI	EXP
<b>Physical State at ambient temp</b>	Liquid	Liquid	MDEQ	
<b>Melting Point (°C)</b>	218	-57	EPI	EXP
<b>Boiling Point (°C)</b>	90	90	EPI	EXP
<b>Solubility (ug/L)</b>	6.74E+6	3.03E+06	EPI	EXP
<b>Vapor Pressure (mmHg at 25°C)</b>	58.52	5.00E+01	PP	EXP
<b>HLC (atm-m<sup>3</sup>/mol at 25°C)</b>	1.60E-3	2.12E-03	EPI	EXP
<b>Log Kow (log P; octanol-water)</b>	2.1	2.00	EPI	EXP
<b>Koc (organic carbon; L/Kg)</b>	55.1	31.82	EPI	EST
<b>Ionizing Koc (L/kg)</b>		NR	NA	NA
<b>Diffusivity in Air (Di; cm<sup>2</sup>/s)</b>	0.0298	5.63E-02	W9	EST
<b>Diffusivity in Water (Dw; cm<sup>2</sup>/s)</b>	1.06E-5	1.0731E-05	W9	EST
<b>Soil Water Partition Coefficient (Kd; inorganics)</b>	NR	NR	NA	NA

	Part 201 Value	Updated Value	Reference Source	Comments
Flash Point (°C)	NA	NA	NA	NA
Lower Explosivity Level (LEL; unit less)	NA	NA	NA	NA
Critical Temperature (K)		5.86E+02	EPA2004	EXP
Enthalpy of Vaporization (cal/mol)		7.80E+03	EPA2004	EST
Density (g/mL, g/cm3)		1.98	CRC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm <sup>2</sup> )	2.40E-05	2.74E-05	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm <sup>2</sup> )	4.81E-05	6.44E-05	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm <sup>2</sup> )	3.33E-05	4.33E-05	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm <sup>2</sup> )	6.38E-05	1.00E-04	EMSOFT	EST

**(B) Toxicity Values/Benchmarks**

	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
Reference Dose (RfD) (mg/kg/day)	1.8E-2	8.0E-3	PPRTV, 2009	
RfD details	<p>Chronic (102 weeks) mouse gavage bioassay (NTP, 1986); NOAEL=none; LOAEL=17.9 mg/kg/day; UF=1000 (10 each for intraspecies variability, interspecies extrapolation and database insufficiency). Critical effect = renal cytomegaly.</p> <p>Source and date: CCD/RRD, 7/16/1987</p>	<p><b>Tier 2 Source:</b>  <b>PPRTV:</b>  <b>Basis:</b> The PPRTV p-RfD is lower than the IRIS because the PPRTV is based on a newer study (Bielmeier et al., 2001) demonstrating a more sensitive developmental adverse effect. In addition, a 2-generation reproductive study has also been published, (CCC, 2002; Christian et al., 2002) that changed the UF for database deficiency from 10 (UF used in the IRIS assessment) to one (1) for this PPRTV p-RfD. The IRIS chronic oral RfD was based on renal cytomegaly (NTP, 1987) and a composite UF of 1000.  <b>PPRTV</b> chronic p-RfD is 8.0E-3 mg/kg-day.  <b>Critical Study:</b> Bielmeier, S.R., D.S. Best, D.L. Guidici et al. 2001. Pregnancy loss in the rat caused by bromodichloromethane. Toxicol. Sci. 59:309–315.  <b>Method(s):</b> female SD rats (13 to 14/dose group) were dosed with 0, 75, or 100 mg/kg-day by aqueous gavage on gestation days (GD) 6 to 10. F344 rats (12 to 14/dose group) were concurrently dosed with 0 or 75 mg/kg-day administered in the same vehicle.  <b>Critical effect:</b> induced full litter resorption in gavage-treated female F344 rats  <b>End point or Point of Departure (POD):</b> BMDL<sub>05</sub> = 0.76 mg/kg-day  <b>Uncertainty Factors:</b> UF = 100 (10 each for intraspecies variability and interspecies extrapolation)  <b>Source and date:</b> PPRTV, 9/16/2009</p> <p><b>Tier 1 and 2 Sources:</b>  <b>IRIS:</b> IRIS (03/01/1991), RfD = 2.0E-2 mg/kg-day. An EPA review of more recent toxicology studies in September 2002 identified one or more significant new studies.  <b>Critical Study:</b> NTP (National Toxicology Program). 1986. Toxicology and Carcinogenesis Studies of Bromodichloromethane in F344/N Rats and B6C3F1 Mice (gavage studies). NTP Technical Report, Ser. No. 321, NIH Publ. No. 87-2537.</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		<p><b>Method(s):</b> BDCM in corn oil was administered by gavage, 5 days/week for 102 weeks, to F344/N rats (50/sex/group) at doses of 0, 50, or 100 mg/kg/day; to male B6C3F1 mice (50/group) at doses of 0, 25, or 50 mg/kg/day; and B6C3F1 female mice (50/group) at doses of 0, 75, or 150 mg/kg/day.</p> <p><b>Critical effect:</b> renal cytomegaly</p> <p><b>End point or Point of Departure (POD):</b> LOAEL = 17.9 mg/kg-day</p> <p><b>Uncertainty Factors:</b> UF = 1,000 (10 each for intraspecies variability and interspecies extrapolation, and 10 for use of a LOAEL and database deficiencies)</p> <p><b>MRL:</b> Per ATSDR (12/1989), oral chronic MRL = 2.0E-2 mg/kg-day based on renal effect:</p> <p><b>Critical Study:</b> NTP (National Toxicology Program). 1986. Toxicology and Carcinogenesis Studies of Bromodichloromethane in F344/N Rats and B6C3F1 Mice (gavage studies). NTP Technical Report, Ser. No. 321, NIH Publ. No. 87-2537.</p> <p><b>Method(s):</b> BDCM in corn oil was administered by gavage, 5 days/week for 102 weeks, to F344/N rats (50/sex/group) at doses of 0, 50, or 100 mg/kg/day; to male B6C3F1 mice (50/group) at doses of 0, 25, or 50 mg/kg/day; and B6C3F1 female mice (50/group) at doses of 0, 75, or 150 mg/kg/day.</p> <p><b>Critical effect:</b> renal cytomegaly in mice</p> <p><b>End point or Point of Departure (POD):</b> LOAEL = 17.9 mg/kg-day</p> <p><b>Uncertainty Factors:</b> UF = 1,000 (10 each for intraspecies variability, interspecies extrapolation, and for use of a LOAEL)</p> <p><b>Tier 3 Source:</b>  <b>MDEQ:</b> Per DEQ-CCD/RRD (7/16/1987), RfD = 1.8E-2 mg/kg-day. Refer to Part 201 Value RfD details</p>		
<b>Oral Cancer Slope Factor (CSF) (mg/kg-day<sup>-1</sup>)</b>	5.0E-2	6.2E-2	IRIS, 1993	
<b>CSF details</b>	SF changed 2/93 (IRIS); 2-year carcinogenicity bioassay (NTP, 1987), gavage	<p><b>Tier 1 Source:</b>  <b>IRIS:</b>  <b>Basis:</b> IRIS (1993) presents the only oral CSF that is available.  <b>Critical Study:</b> NTP (National Toxicology Program). 1987. Toxicology and carcinogenesis studies of bromodichloromethane in F/344 rats and B6C3F1 mice</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
	<p>corn oil; Kidney tumors in male mice served as basis for SF. IRIS selected most sensitive species for generating SF in accordance with Chrc. Assess't. Guidelines. Revised species scaling factor of (BWh/BWa) to the 0.25 power used for q* calculation. EPB-CCD Entry date: 1/10/2000</p>	<p>(gavage studies). NTP TR 321.  <b>Method(s):</b> BDCM was administered in corn oil by gavage, 5 days/week for 102 weeks, to 1) F344/N rats (50/sex/dose) at 0, 50 or 100 mg/kg/day, 2) male B6C3F1 mice at 0, 25 or 50 mg/kg/day, and 3) female B6C3F1 mice at 0, 75 or 150 mg/kg/day.                      1) <i>Dose response data: Tumor Type</i> - Kidney (tubular cell adenoma and tubular cell adenocarcinoma)                      2) Test animals: B6C3F1 mice, male ; <i>Test Species</i> - mice; <i>Route</i> - oral (gavage)                      3) <i>Extrapolation method:</i> Linearized multistage procedure, extra risk  <b>Carcinogen Weight-of-Evidence (WOE) Class:</b> B2 - likely to be carcinogenic to humans by the oral route  <b>IRIS WOE Basis:</b> sufficient evidence of carcinogenicity in two animal species (mice and rats)  <b>Source and Date:</b> IRIS, 3/01/1993 and PPRTV, 9/16/2009.  <b>Tier 2 Sources:</b>  <b>PPRTV:</b> PPRTV (9/16/2009) refers to the IRIS value and summarizes three studies published since 1993 (IRIS). PPRVT does not provide a CSF different than provided in IRIS. The three studies summarized in PPRTV are Aida et al. (1992), George et al. (2002), and NTP (2006). None provide data from which a CSF can be generated. (The NTP (2006) 2-year cancer bioassay reported that BDCM exposure via drinking water did not result in a statistically significant increase in the incidence of any neoplasm in male rats or female mice. In this study, male F344/N rats and female B6C3F1 mice (50/species/dose) were exposed to 0, 175, 350, and 700 mg/L BDCM in drinking water for 105 weeks. Explanation for different tumor responses observed between the NTP (1987) and NTP (2006) carcinogenicity bioassays includes the influence of the vehicle (i.e., corn oil versus drinking water), the stability of BDCM in drinking water, and different absorption rates after exposure by gavage versus drinking water.)  <b>MRL:</b> NA; MRLs are for non-cancer effects only.</p>		



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		<b>Tier 3 Source:</b> <b>MDEQ:</b> Per DEQ-CCD/RRD, SF = 5.0E-2 (mg/kg-day) <sup>-1</sup> . See Part 201 Value CSF details.		
<b>Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) (µg/m<sup>3</sup>)</b>	--	2.0E+0	PPRTV, 2009	
<b>RfC/ITSL details</b>	NA	<b>Tier 2 Source:</b> <b>PPRTV:</b> <b>Basis:</b> PPRTV (9/16/2009) provides the only RfC that is currently available. PPRTV chronic pRfC = 2.0E-2 mg/m <sup>3</sup> . MDEQ applied an additional UF of 10 for use of less than chronic study was applied to the chronic pRfC to derive a chronic RfC = 2.0E-3 mg/m <sup>3</sup> (2.0 µg/m <sup>3</sup> ). The only available inhalation study (Torti et al, 2001) is a 3-week study of mice. The findings (target organ and effects) of the 3-week study are supported by a 1-week study (also reported by Torti et al., 2001). <b>Critical Study:</b> Torti, V.R., A.J. Cobb, J.I. Everitt et al. 2001. Nephrotoxicity and hepatotoxicity induced by inhaled bromodichloromethane in wild-type and p53-heterozygous mice. Toxicol. Sci. 64:269–280. <b>Method(s):</b> Wild-type (p53+/+) and genetically engineered p53 heterozygous (p53+/-) male mice. C57BL/6, FVB/N, C57BL/6 p53+/-, and FVB/N p53+/- mice (6 mice/type/concentration) were exposed to target exposure concentrations of 0, 0.3, 1, 3, 10, or 30 ppm (0, 2.0, 6.7, 20, 67, or 201 mg/m <sup>3</sup> ) for six hours/day, seven days/week for three weeks by inhalation. <b>Critical effect:</b> kidney degeneration <b>End point or Point of Departure (POD):</b> NOAEL = 20 mg/m <sup>3</sup> ; NOAEL <sub>HEC</sub> = 5 mg/m <sup>3</sup> . <b>Uncertainty Factors:</b> UF = 300 (10 each for intraspecies variability and database deficiency and 3 for interspecies (pharmacodynamics) extrapolation.) <b>Source and date:</b> PPRTV, 9/16/2009  <b>Tier 1 and 2 Sources:</b> <b>IRIS:</b> Per IRIS (3/01/1993), no value at this time.		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		<p><b>MRL:</b> Per ATSDR (July, 2013), no inhalation MRL at this time.</p> <p><b>Tier 3 Source:</b></p> <p><b>MDEQ:</b> Per DEQ-CCD/AQD, no value at this time.</p>		
<b>Inhalation Unit Risk Factor (IURF) ((<math>\mu\text{g}/\text{m}^3</math>)<sup>-1</sup>)</b>	3.7E-5	1.77E-5	MDEQ, 2009	
<b>IURF details</b>	Source: Interim	<p><b>Tier 3 Source:</b></p> <p><b>Basis:</b> MDEQ is chosen over CAL because CAL is based on IRIS values that is no longer available nor are the details available. NJ is based on CAL.</p> <p><b>Tier 1 and 2 Sources:</b></p> <p><b>IRIS:</b> Per IRIS (3/01/1993), no value at this time.</p> <p><b>PPRTV:</b> Per PPRTV (9/16/2009), no value at this time.</p> <p><b>MRL:</b> NA; MRLs are for non-cancer effects only.</p> <p><b>MDEQ:</b> AQD IURF = <math>1.77\text{E}-5</math> (<math>\mu\text{g}/\text{m}^3</math>)<sup>-1</sup>. Annual averaging time. This value is based on the IRIS oral CSF <math>6.2\text{E}-2</math> (<math>\text{mg}/\text{kg}/\text{day}</math>)<sup>-1</sup> (1993). Derived: <math>6.2\text{E}-2</math> (<math>\text{mg}/\text{kg}/\text{day}</math>)<sup>-1</sup> x <math>20</math> <math>\text{m}^3/70\text{kg}</math> x <math>1\text{mg}/1000\mu\text{g}</math> = <math>1.77\text{E}-5</math> (<math>\mu\text{g}/\text{m}^3</math>)<sup>-1</sup>.</p> <p><b>Source and Date:</b> MDEQ-CCD/AQD, 3/06/2009</p> <p><b>New Jersey DEP 2009:</b> IURF= <math>0.000037</math> (<math>\mu\text{g}/\text{m}^3</math>)<sup>-1</sup>. Based on California 04. The 2009 IURF was removed from the more recent NJDEP August 2011 toxicity table and will not be considered in MDEQ's review.</p> <p><b>California 2011:</b> <math>3.5\text{E}-5</math> (<math>\mu\text{g}/\text{m}^3</math>)<sup>-1</sup>. Based on IRIS oral CSF (1993). No further details available. OEHHA Toxicity Criteria Database Updated 2011. <a href="http://oehha.ca.gov/tcdb/index.asp">http://oehha.ca.gov/tcdb/index.asp</a></p> <p><b>RIVM:</b> Documents are not in in English, cannot be evaluated.</p> <p><b>Other Tier 3:</b> No value is available at this time from these Tier 3 sources/databases: HEAST, NTP ROC, health and environmental agencies of</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		Massachusetts, Minnesota, New York, and Texas, WHO (IARC), WHO (IPCS/INCHEM), Canada, The Netherlands (RIVM), ECHA (REACH) and OECD HPV.		
Mutagenic Mode of Action (MMAOA)? (Y/N)	--	NO	USEPA, 2015	
MMAOA Details	--	NA Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List.		
Developmental or Reproductive Effector? (Y/N)	No	YES-oral No-inhalation. The RfD is based on a reproductive-developmental effect. Oral Exposure Pathways- Single Exposure	MDEQ, 2014	
Developmental or Reproductive Toxicity Details	NA	<b>Critical effect:</b> induced full litter resorption in gavage-treated female F344 rats <b>Developmental/Reproductive Study:</b> Bielmeier, S.R., D.S. Best, D.L. Guidici et al. 2001. Pregnancy loss in the rat caused by bromodichloromethane. Toxicol. Sci. 59:309–315. <b>Method(s):</b> Female SD rats (13 to 14/dose group) were dosed with 0, 75, or 100 mg/kg-day by aqueous gavage in on gestation days (GD) 6 to 10. F344 rats (12 to 14/dose group) were concurrently dosed with 0 or 75 mg/kg-day administered in the same vehicle		
State Drinking Water Standard (SDWS) (ug/L)	80	80 (total*)	SDWA, 1976	
SDWS details	MDEQ-CCD/WRD, 11/2/2004	*The value is for total trihalomethanes. Source: MI Safe Drinking Water Act (SDWA) 1976 PA 399		
Secondary Maximum Contaminant Level (SMCL) (ug/L)	--	NO	SDWA, 1976 and USEPA SMCL List	
SMCL details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399 and USEPA SMCL List, 2015		
Is there an aesthetic value for drinking water? (Y/N)	NO	Not evaluated.	NA	

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
<b>Aesthetic value (ug/L)</b>	NA	NA	NA	
<b>Aesthetic Value details</b>	NA	NA		
<b>Phytotoxicity Value? (Y/N)</b>	NO	Not evaluated.	NA	
<b>Phytotoxicity details</b>	NA	NA	NA	
<b>Others</b>				

**(C) Chemical-specific Absorption Factors**

	Part 201 Value	Update	Source/Reference/ Dates	Comments/Notes /Issues
Gastrointestinal absorption efficiency value (ABS <sub>gi</sub> )	---	1.0	MDEQ, 2015/USEPA RAGS-E, 2004	
ABS <sub>gi</sub> details		RAGS E (USEPA, 2004) Default Value		
Skin absorption efficiency value (AE <sub>d</sub> )	---	0.1	MDEQ, 2015	
AE <sub>d</sub> details				
Ingestion Absorption Efficiency (AE <sub>i</sub> )		1.0	MDEQ, 2015	
AE <sub>i</sub> Details				
Relative Source Contribution for Water (RSC <sub>w</sub> )		0.2	MDEQ, 2015	
Relative Source Contribution for Soil (RSC <sub>s</sub> )		1.0	MDEQ, 2015	
Relative Source Contribution for Air (RSC <sub>A</sub> )		1.0	MDEQ, 2015	
Others				

**(D) Rule 57 Water Quality Values and GSI Criteria**

<b>Current GSI value (µg/L)</b>	ID
<b>Updated GSI value (µg/L)</b>	ID
<b>Rule 57 Drinking Water Value (µg/L)</b>	6.8

	<b>Rule 57 Value (µg/L)</b>	<b>Verification Date</b>
<b>Human Non-cancer Values- Drinking water source (HNV-drink)</b>	170	11/2008
<b>Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)</b>	4,500	11/2008
<b>Wildlife Value (WV)</b>	NA	
<b>Human Cancer Values for Drinking Water Source (HCV-drink)</b>	6.8	11/2008
<b>Human Cancer values for non-drinking water source (HCV-Non-drink)</b>	180	11/2008
<b>Final Chronic Value (FCV)</b>	ID	6/2008
<b>Aquatic maximum value (AMV)</b>	ID	6/2008
<b>Final Acute Value (FAV)</b>	ID	6/2008

Sources:

1. MDEQ Surface Water Assessment Section Rule 57 [website](#)
2. MDEQ Rule 57 [table](#)



**(E) Target Detection Limits (TDL)**

	<b>Value</b>	<b>Source</b>
<b>Target Detection Limit – Soil (<math>\mu\text{g}/\text{kg}</math>)</b>	100	MDEQ, 2015
<b>Target Detection Limit – Water (<math>\mu\text{g}/\text{L}</math>)</b>	1	MDEQ, 2015
<b>Target Detection Limit – Air (ppbv)</b>	2.10E-01	MDEQ, 2015
<b>Target Detection Limit – Soil Gas (ppbv)</b>	7.10E+00	MDEQ, 2015

**CHEMICAL UPDATE WORKSHEET ABBREVIATIONS:**

CAS # - Chemical Abstract Service Number.

**Section (A) Chemical-Physical Properties****Reference Source(s):**

CRC	Chemical Rubber Company Handbook of Chemistry and Physics, 95th edition, 2014-2015
EMSOFT	USEPA Exposure Model for Soil-Organic Fate and Transport (EMSOFT) (EPA, 2002)
EPA2001	USEPA (2001) Fact Sheet, Correcting the Henry's Law Constant for Soil Temperature. Office of Solid Waste and Emergency Response, Washington, D.C.
EPA4	USEPA (2004) User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. February 22, 2004.
EPI	USEPA's Estimation Programs Interface SUITE 4.1, Copyright 2000-2012
HSDB	Hazardous Substances Data Bank
MDEQ	Michigan Department of Environmental Quality
NPG	National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards
PC	National Center for Biotechnology Information's PubChem database
PP	Syracuse Research Corporation's PhysProp database
SCDM	USEPA's Superfund Chemical Data Matrix
SSG	USEPA's Soil Screening Guidance: Technical Background Document, Second Edition, 1996
USEPA/EPA	United States environmental protection agency's Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). July, 2004.

W9 USEPA's User Guide for Water9 Software, Version 2.0.0, 2001

**Basis/Comments:**

EST	estimated
EXP	experimental
EXT	extrapolated
NA	not available or not applicable
NR	not relevant

**Section (B) Toxicity Values/Benchmarks****Sources/References:**

ATSDR	Agency for Toxic Substances and Disease Registry
CALEPA	California Environmental Protection Agency
CAL DTSC	California Department of Toxic Substances Control
CAL OEHHA	CAEPA Office of Environmental Health Hazard Assessment
CCD	MDEQ Chemical Criteria Database
ECHA	European Chemicals Agency (REACH)
OECD HPV	Organization for Economic Cooperation and Development HPV Database
HEAST	USEPA's Health Effects Assessment Summary Tables
IRIS	USEPA's Integrated Risk Information System
MADEP	Massachusetts Department of Environmental Protection
MDEQ/DEQ	Michigan Department of Environmental Quality
DEQ-CCD/AQD	MDEQ Air Quality Division
DEQ-CCD/RRD	MDEQ Remediation and Redevelopment Division
DEQ-CCD/WRD	MDEQ Water Resources Division
MNDOH	Minnesota Department of Health

NJDEP	New Jersey Department of Environmental Protection
NYDEC	New York State Department of Environmental Conservation
OPP/OPPT	USEPA's Office of Pesticide Programs
PPRTV	USEPA's Provisional Peer Reviewed Toxicity Values
RIVM	The Netherlands National Institute of Public Health and the Environment
TCEQ	Texas Commission on Environmental Quality
USEPA	United States Environmental Protection Agency
USEPA OSWER	USEPA Office of Solid Waste and Emergency Response
USEPA MCL	USEPA Maximum Contaminant Level
WHO	World Health Organization
WHO IPCS	International Programme on Chemical Safety (IPCS/INCHEM)
WHO IARC	International Agency for Research on Cancers
NA	Not Available.
NR	Not Relevant.

**Toxicity terms:**

BMC	Benchmark concentration
BMCL	Lower bound confidence limit on the BMC
BMD	benchmark dose
BMDL	Lower bound confidence limit on the BMD
CSF	Cancer slope Factor
CNS	Central nervous system
IURF or IUR	Inhalation unit risk factor
LOAEL	Lowest observed adverse effect level
LOEL	Lowest observed effect level
MRL	Minimal risk level (ATSDR)
NOAEL	No observed adverse effect level
NOEL	No observed effect level

RfC	Reference concentration
RfD	Reference dose
p-RfD	Provisional RfD
aRfD	Acute RfD
UF	Uncertainty factor
WOE	Weight of evidence

**Section (C) Chemical-specific Absorption Factors**

MDEQ	Michigan Department of Environmental Quality
USEPA RAGS-E	United States Environmental Protection Agency's Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). July, 2004.

**Section (D) Rule 57 Water Quality Values and GSI Criteria**

GSI	Groundwater-surface water interface
NA	A value is not available or not applicable.
ID	Insufficient data to derive value
NLS	No literature search has been conducted