



## CHEMICAL UPDATE WORKSHEET

<b>Chemical Name:</b>	<b>Acetophenone</b>
<b>CAS #:</b>	<b>98-86-2</b>
<b>Revised By:</b>	RRD Toxicology Unit
<b>Revision Date:</b>	January 5, 2016

### (A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
<b>Molecular Weight (g/mol)</b>	120.2	120.15	EPI	EXP
<b>Physical State at ambient temp</b>	Liquid	Liquid	MDEQ	
<b>Melting Point (°C)</b>	20	20.00	EPI	EXP
<b>Boiling Point (°C)</b>	202	202.00	EPI	EXP
<b>Solubility (ug/L)</b>	6.1E+6	6.13E+06	EPI	EXP
<b>Vapor Pressure (mmHg at 25°C)</b>	0.4	3.97E-01	EPI	EXP
<b>HLC (atm-m<sup>3</sup>/mol at 25°C)</b>	1.1E-5	1.04E-05	EPI	EXP
<b>Log Kow (log P; octanol-water)</b>	1.6	1.58	EPI	EXP
<b>Koc (organic carbon; L/Kg)</b>	37.4	51.85	EPI	EST
<b>Ionizing Koc (L/kg)</b>		NR	NA	NA
<b>Diffusivity in Air (Di; cm<sup>2</sup>/s)</b>	0.08	6.52E-02	W9	EST
<b>Diffusivity in Water (Dw; cm<sup>2</sup>/s)</b>	8.0E-6	8.7229E-06	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	77	CRC	EXP
Lower Explosivity Level (LEL; unit less)	NA	NA	NA	NA
Critical Temperature (K)		709.50	EPA2004	EXP
Enthalpy of Vaporization (cal/mol)		1.17E+04	EPA2004	EXP
Density (g/mL, g/cm <sup>3</sup> )		1.0281	CRC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm <sup>2</sup> )	1.10E-05	1.46E-05	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm <sup>2</sup> )	1.12E-05	1.60E-05	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm <sup>2</sup> )	1.33E-05	1.95E-05	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm <sup>2</sup> )	1.34E-05	2.03E-05	EMSOFT	EST

**(B) Toxicity Values/Benchmarks**

	Part 201 Value	Updated Value	Source*/Reference /Date	Comments/Notes /Issues
<b>Reference Dose (RfD) (mg/kg/day)</b>	2.1E-1	8.0E-1	PPRTV, 2011/MDEQ 2015	
<b>RfD details</b>	NOAEL of 10,000 ppm (8450 ppm after accounting for 15.5% volatilization per authors = 617 mg/kg/day) in male and female Osborne-Mendel rats exposed in diet for 17 weeks. Critical effect - none - general toxicity listed in IRIS since no effects observed in all three study doses. Note that NOAEL is at half of the low end of the lethal dose range. UF=3000, 10 for protection of sensitive human subgroups, 10 for interspecies differences, 10 for sub chronic to chronic	<p><b>Basis:</b> The PPRTV screening sub-chronic value of 8.0E-1 mg/kg-day was used as basis for the RfD. Since developmental effects were noted, an additional UF of 10 to account for sub chronic to chronic exposure extrapolation was not used. This RfD is from a critical study that is more current and included neurological and reproductive/developmental screening. The Hagan et al. (1967) study used as critical study for the IRIS RfD did not observe any effects and did not include neurological tests and screening of reproductive/developmental effects. Per PPRTV, a chronic or sub chronic pRfD value could not be derived based on either the Hagan et al. (1967) or ATF (2003) studies. The Hagan et al. (1967) study limitations included insufficient presentation of data, absence of effects even at the highest dose tested, and neurological or reproductive/developmental effects were not evaluated. ATF (2003), a more current repeated dose toxicity study, included neurological tests and reproductive/developmental screening. This study reported observed neurological and reproductive/developmental effects. Per PPRTV, the ATF (2003) study provides a lower POD for endpoints not tested in the Hagan et al. (1967) study. However, the sub chronic p-RfD derived from the ATF (2003) study was relegated to a screening value because the study was not peer reviewed and the data were not available for review.</p> <p><b>Critical Study:</b> The ATF (2003) study is reported as proprietary data. Only the text was available for review (no data summary tables were available). Per PPRTV, the study was stated to be a combined repeated dose toxicity test and reproductive/developmental screening test conducted according to the Organization for Economic Co-operation and Development (OECD) Guideline No. 422 and was GLP compliant.</p> <p><b>Method:</b> Sprague-Dawley rats (10 male and 5 female rats/treatment group for the repeated dose toxicity portion of the test) were exposed to adjusted doses of 0, 75, 225, or 750 mg/kg-day acetophenone (98.8% pure) in corn oil daily via gavage for a minimum of 28 days during the toxicity phase. Males from the toxicity phase were mated with females in the reproduction phase. (I believe this</p>		Complete

	Part 201 Value	Updated Value	Source*/Reference /Date	Comments/Notes /Issues
	<p>extrapolation and 3 for inadequate database since only 1 sub chronic study with only 10 rats/sex/group and NOAEL is close to a lethal dose.</p>	<p>means that the same males were used in the repro phase but different females were used for the repro phase and tox phase females were sacrificed after the 28 day exposure. As a result, females from the developmental study were treated for 14 days and the males were treated for 28 plus 14 days.) In the reproductive/developmental phase of the ATF (2003) study, male and female rats were treated for a minimum of 14 days before mating, and female rats were treated through Lactation Day (LD) 3. The F0 generation was checked twice per day for mortality and general health. Detailed clinical observations were conducted at least weekly until evidence of mating, and then females were checked daily through gestation and lactation. Males were processed as part of the repeated dose toxicity study detailed above. After at least 14 days of treatment, a single male was cohabitated with a single female for a maximum of 14 days. Females with no evidence of mating were sacrificed 19 days after mating began, females that failed to deliver were sacrificed on GD 25, and F0 females and their offspring were sacrificed on LD 4.</p> <p><b>Critical effects:</b> neurotoxicity, reproductive and developmental toxicity (decreased mean forelimb grip strength and motor activity in male rats, decreased live birth index; and decreased number of F1 pups surviving to LD 4, and decreased pup body weight.)</p> <p><b>End point or Point of Departure (POD):</b> adjusted NOAEL = 225 mg/kg-day</p> <p><b>Uncertainty Factors:</b> 300 (10 each for intraspecies variability and interspecies extrapolation, and 3 for database deficiency)</p> <p><b>Source and date:</b> PPRTV, 6/15/2011</p> <p><b>Tier 1 and 2 Sources:</b></p> <p><b>IRIS:</b> Per IRIS (1/01/1989), RfD = 1.0E-1 mg/kg-day.</p> <p><b>Critical Study:</b> Hagan, EC; Hansen, WH; Fitzhugh, OG; et al. (1967) Food flavorings and compounds of related structure. II. Subacute and chronic toxicity. Food Cosmet Toxicol 5(2):141–157. HERO ID 399321.</p> <p><b>Method(s):</b> Rat oral sub chronic study. Male and female (10/sex/dose) Osborne-Mendel rats are exposed to 0, 1000, 2500, or 10,000 ppm acetophenone in diet for 17 weeks. (at 15.5% volatilization, 10,000 ppm x 0.845 = 8450 ppm. Assuming</p>		

	Part 201 Value	Updated Value	Source*/Reference /Date	Comments/Notes /Issues
		<p>a rat daily food consumption of 5% of its body weight, 8450 ppm (mg/kg food) x 0.05 kg food/kg bw = 423 mg/kg/day.)</p> <p><b>Critical effect:</b> general toxicity</p> <p><b>End point or Point of Departure (POD):</b> NOAEL = 10,000 ppm (423 mg/kg-day)</p> <p><b>Uncertainty Factors:</b> UF = 3,000 (10 each for intraspecies variability, interspecies extrapolation and use of a sub chronic study, and 3 for database deficiencies.)</p> <p><b>Source and date:</b> IRIS, Last revision date - 1/01/1989</p> <p><b>MRL:</b> No MRL record available at this time.</p> <p><b>Tier 3 Sources:</b></p> <p><b>MDEQ:</b> Per DEQ-CCD/RRD RfD = 0.21 mg/kg/day.</p> <p><b>WHO</b> (in PPRTV, 2011): 3 µg/kg-day (3.0E-3 mg/kg-day)</p>		
<b>Oral Cancer Slope Factor (CSF) (mg/kg-day)<sup>-1</sup></b>	--	NA	MDEQ, 2015	
<b>CSF details</b>	Class D - no human and no animal data.	<p><b>Carcinogen Weight-of-Evidence (WOE) Class:</b> Class D - "Inadequate Information to Assess Carcinogenic Potential"</p> <p><b>IRIS WOE Basis:</b> No human or animal data are available to assess the carcinogenicity of oral exposure.</p> <p><b>Source and Date:</b> IRIS, 2/01/1991</p> <p><b>Tier 1 and 2 Sources:</b></p> <p><b>IRIS:</b> Per IRIS (02/01/1991), no value at this time</p> <p><b>PPRTV:</b> Per PPRTV (6/15/2011, no value at this time.</p> <p><b>MRL:</b> NA; MRLs are for non-cancer effects only.</p> <p><b>Tier 3 Source:</b></p> <p><b>MDEQ:</b> Per DEQ-CCD, no value at this time.</p>		Complete
<b>Reference Concentration (RfC) or Initial Threshold Screening Level</b>	4.9E+2	3.2E+3	MDEQ 2015	



	Part 201 Value	Updated Value	Source*/Reference /Date	Comments/Notes /Issues
(ITSL) (µg/m³)				
<b>RfC/ITSL details</b>	ITSL based on TLV from ACGIH.	<p><b>Basis:</b> MDEQ route extrapolation of the modified PPRTV RfD = 8.0E-1 mg/kg-day assuming 20 m<sup>3</sup>/day air rate and 80 kg adult body weight. MDEQ is more current than ECHA.</p> <p><b>Discussion and Recommendation:</b> MDEQ (1994) ITSL of 4.9E+2 µg/m<sup>3</sup> is based on ACGIH TLV of 49 mg/m<sup>3</sup> for eye irritation, which is an acute effect. ECHA (REACH) extrapolated an inhalation DNEL of 1.8E+4 µg/m<sup>3</sup> based on a NOEL = 750 mg/kg day from a sub chronic oral study (Hagan, 1967) and UF of 10; therefore, oral DNEL = 75 mg/kg day. The PPRTV (2011) derived a screening sub chronic RfD of 8.0E-1 mg/kg-day based on a combined repeated dose toxicity study and reproduction/developmental screening study. (ATF, 2003; also Kapp et al., 2003). MDEQ prefers repeated dose toxicity as basis for toxicity endpoints; therefore, the RfC value based on a route to route extrapolation of the MDEQ modified PPRTV RfD is recommended as it is based on a newer repeated dose toxicity study that includes information on reproductive and developmental toxicity. Recommended RfC = (8.0E-1 x 80)/20 = 3.2 mg/m<sup>3</sup> or 3.2E+3 µg/m<sup>3</sup>. (assumes 20 m<sup>3</sup>/day air rate and 80 kg adult body weight)</p> <p><b>Tier 1 and 2 Sources:</b> <b>IRIS:</b> Per IRIS (02/01/1991), no value at this time <b>PPRTV:</b> Per PPRTV (6/15/2011), no value at this time. <b>MRL:</b> No MRL record available at this time.</p> <p><b>Tier 3 Sources:</b> <b>MDEQ:</b> Per CCD/AQD, ITSL = 4.9E+2 µg/m<sup>3</sup> with 8 hour averaging time. <b>Basis:</b> ITSL is based upon an ACGIH TLV of 49 mg/m<sup>3</sup>. ITSL = 49 mg/m<sup>3</sup> x 1,000 µg/mg = 49,000 µg/m<sup>3</sup> x 1% = 490 ug/m<sup>3</sup>. <b>Method:</b> ACGIH adopted a TLV for acetophenone based on a recommendation to reduce eye irritation. Application of acetophenone to the eyes of rabbits as two drops of saturated aqueous solution caused discomfort; however, the effects were limited to a transient optical irregularity of the corneal epithelium, with no</p>		Complete



	Part 201 Value	Updated Value	Source*/Reference /Date	Comments/Notes /Issues
		<p>opacity, and the eyes returned to normal by the next day. Additionally 1 one study reported that instillation of 771 mg of undiluted acetophenone into the eyes of rabbits produced moderate irritation and transient corneal injury. Per AQD, although these studies indicate a low degree of eye irritation, data on long term safety is limited.</p> <p><b>Reference:</b> ACGIH (1993). Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. 1993-1994. American Conference of Governmental Industrial Hygienists, Cincinnati, p.12.</p> <p><b>Source and date:</b> MDEQ-AQD, 6/08/1994</p> <p><b>ECHA (REACH):</b> Derived No Effect Level (DNEL) = 18.4 mg/m<sup>3</sup> (1.8E+4 µg/m<sup>3</sup>)</p> <p><u>Basis:</u>                      NOAEC: 184 mg/m<sup>3</sup>                      Justification for route to route extrapolation: 1.15 m<sup>3</sup>/kg bw (default), 0.5 absorption via inhalation factor 2 higher compared to oral (default)                      Oral DNEL Basis:                      Key Study 1: Hagan EC, Hansen WH, Fitzhugh OG, Jenner PM, Jones WI, Taylor JM, Long EL, Nelson AA, Brouwer JB. 1967. Food flavorings and compounds of related structure. II. Subacute and chronic toxicity, Fd Cosmet Toxicol 5: 141-157                      Methods: Groups of 10 male and 10 female weanling Osborne-Mendel rats were exposed to 0, 1,000, 2,500 and 10,000 ppm. acetophenone in food for 17 weeks. NOEL: 10,000 ppm in food (750 mg/kg bw/d) report. A NOAEL of 423 mg/kg was estimated by US-EPA IRIS, taking into account the loss by evaporation from food.                      Critical Effect: No effect at the highest dose                      Overall assessment factor (AF) =10                      AF for differences in duration of exposure = 2                      AF for interspecies differences = 5                      Source: ECHA Reach Database Acetophenone                      Additional Note: ECHA considered a combined repeated dose toxicity study and reproduction/developmental screening study as a 2<sup>nd</sup> key study (Kapp et al., 2003). See Tier 3 Data Worksheet for details.</p>		

	Part 201 Value	Updated Value	Source*/Reference /Date	Comments/Notes /Issues
		<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 California, Massachusetts, Minnesota, New Jersey, New York, and Texas, WHO (IARC), WHO (IPCS/INCHEM), Canada, The Netherlands (RIVM) and OECD HPV.		
<b>Inhalation Unit Risk Factor (IURF) ((<math>\mu\text{g}/\text{m}^3</math>)<sup>-1</sup>)</b>	--	NA	MDEQ, 2015	
<b>IURF details</b>	NA	<p><b>Carcinogen Weight-of-Evidence (WOE) Class:</b> "Inadequate Information to Assess Carcinogenic Potential"</p> <p><b>IRIS WOE Basis:</b> No human or animal data are available to assess the carcinogenicity of oral exposure.</p> <p><b>Source and Date:</b> IRIS, 2/01/1991</p> <p><b>Tier 1 and 2 Sources:</b></p> <p><b>IRIS:</b> Per IRIS (02/01/1991), no value at this time</p> <p><b>PPRTV:</b> Per PPRTV (6/15/2011), no value at this time.</p> <p><b>MRL:</b> NA; MRLs are for non-cancer effects only.</p> <p><b>Tier 3 Sources:</b></p> <p><b>MDEQ:</b> Per DEQ-CCD, no value at this time.</p>		Complete
<b>Mutagenic Mode of Action (MMOA)? (Y/N)</b>	--	NO	USEPA, 2015	
<b>MMOA Details</b>	--	NA Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List.		
<b>Developmental or Reproductive Effector? (Y/N)</b>	No	<p>Yes. The RfD is based on a reproductive-developmental effect. The RfC is based on route to route extrapolation of the RfD; therefore, the RfC is also based on reproductive-developmental effect.</p> <p>Oral Exposure Pathways- Single Exposure Inhalation Exposure Pathways- Single Exposure</p>	MDEQ, 2015;	
<b>Developmental or Reproductive</b>	NA	<p><b>RfD:</b></p> <p><b>Critical Study:</b> The ATF (2003) study is reported as proprietary data. Only the text</p>		

	Part 201 Value	Updated Value	Source*/Reference /Date	Comments/Notes /Issues
<b>Toxicity Details</b>		<p>was available for review (no data summary tables were available). Per PPRTV, the study was stated to be a combined repeated dose toxicity test and reproductive/developmental screening test conducted according to the Organization for Economic Co-operation and Development (OECD) Guideline No. 422 and was GLP compliant.</p> <p><b>Critical effects:</b> neurotoxicity, reproductive and developmental toxicity (decreased mean forelimb grip strength and motor activity in male rats, decreased live birth index; and decreased number of F1 pups surviving to LD 4, and decreased pup body weight.)</p> <p><b>RfC:</b> RfC is based on route extrapolation of the modified PPRTV RfD = 8.0E-2 mg/kg-day.</p>		
<b>State Drinking Water Standard (SDWS) (ug/L)</b>	--	NO	SDWA, 1976	
<b>SDWS details</b>	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399		
<b>Secondary Maximum Contaminant Level (SMCL) (ug/L)</b>	--	NO	SDWA, 1976 and USEPA SMCL List	
<b>SMCL details</b>	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399 and USEPA SMCL List		
<b>Is there an aesthetic value for drinking water? (Y/N)</b>	NO	Not evaluated.	NA	
<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	

	Part 201 Value	Updated Value	Source*/Reference /Date	Comments/Notes /Issues
Others				

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

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

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

Current GSI value ( $\mu\text{g/L}$ )	ID
Updated GSI value ( $\mu\text{g/L}$ )	ID
Rule 57 Drinking Water Value ( $\mu\text{g/L}$ )	ID

	Rule 57 Value ( $\mu\text{g/L}$ )	Verification Date
Human Non-cancer Values- Drinking water source (HNV-drink)	ID	8/2001
Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)	ID	8/2001
Wildlife Value (WV)	NA	NA
Human Cancer Values for Drinking Water Source (HCV-drink)	NA	NA
Human Cancer values for non-drinking water source (HCV-Non-drink)	NA	NA
Final Chronic Value (FCV)	ID	9/2001
Aquatic maximum value (AMV)	ID	9/2001
Final Acute Value (FAV)	ID	9/2001

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>	330	MDEQ, 2015
<b>Target Detection Limit – Water (<math>\mu\text{g}/\text{L}</math>)</b>	5	MDEQ, 2015
<b>Target Detection Limit – Air (ppbv)</b>	9.90E+01	MDEQ, 2015
<b>Target Detection Limit – Soil Gas (ppbv)</b>	3.30E+03	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 OEHHHA	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