CHEMICAL UPDATE WORKSHEET

Chemical Name:	**Polychlorinated biphenyls**
CAS #:	**1336-36-3**
Revised By:	RRD Toxicology Unit
Revision Date:	August 19, 2015

(A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
Molecular Weight (g/mol)	268.4	291.99	EPI	EXP
Physical State at ambient temp	Solid	Solid	MDEQ	
Melting Point (˚C)	---	NA	NA	NA
Boiling Point (˚C)	---	357.50	HSDB	EXP
Solubility (ug/L)	44.7	700	EPI	EXP
Vapor Pressure (mmHg at 25˚C)	0.000076	4.94E-04	PP	EST
HLC (atm-m^3/mol at 25˚C)	4.20E-4	4.15E-04	EPI	EXP
Log Kow (log P; octanol-water)	5.58	7.10	EPI	EXP
Koc (organic carbon; L/Kg)	3.06E+5	7.810E+04	EPI	EST
Ionizing Koc (L/kg)		NR	NA	NA
Diffusivity in Air (Di; cm^2/s)	0.08	4.32E-02	W9	EST
Diffusivity in Water (Dw; cm^2/s)	8.0E-6	5.04E-06	W9	EST
Soil Water Partition Coefficient (Kd; inorganics)	NR	NR	NA	NA

	Part 201 Value	Updated Value	Reference Source	Comments
Flash Point (˚C)	NA	NA	NA	NA
Lower Explosivity Level (LEL; unitless)	NA	NA	NA	NA
Critical Temperature (K)		NA	NA	NA
Enthalpy of Vaporization (cal/mol)		NA	NA	NA
Density (g/mL, g/cm^3)		NA	NA	NA
EMSOFT Flux Residential 2 m (mg/day/cm^2)	2.00E-08	2.42E-06	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm^2)	2.00E-08	2.42E-06	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm^2)	2.27E-08	3.06E-06	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm^2)	2.27E-08	3.06E-06	EMSOFT	EST

(B) Toxicity Values/Benchmarks

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
Reference Dose (RfD) (mg/kg/day)	2.0E-5	2.0E-5	IRIS, 1996 (RfD for Aroclor 1254)	
RfD details	Per RD: RfD of 2.0E-5 is based on Aroclor 1254, critical effects are ocular exudate, inflamed and prominent Meibomian glands, distorted growth of finger and toe nails; decreased antibody (IgG and IgM) response to sheep erythrocytes; UF = 300: 10 for intraspecies variability (sensitive individuals), 3 for interspecies (monkeys to humans); 3 for subchronic to chronic; and a "partial factor" (3??) for use of a "minimal" LOAEL.	**Tier 1 Source:** **IRIS:** **Basis:** IRIS is a Tier 1 source. **Critical Studies**: • Arnold, D.L., F. Bryce, R. Stapley et al. 1993a. Toxicological consequences of Aroclor 1254 ingestion by female Rhesus (Macaca mulatta) monkeys, Part 1A: Prebreeding phase - clinical health findings. Food Chem. Toxicol. 31: 799- 810. (e-copy in tox assessment folder) • Arnold, D.L., F. Bryce, K. Karpinski et al. 1993b. Toxicological consequences of Aroclor 1254 ingestion by female Rhesus (Macaca mulatta) monkeys, Part 1B: Prebreeding phase -clinical and analytical laboratory findings. Food Chem. Toxicol. 31: 811-824. (e-copy in tox assessment folder) • Tryphonas, H., S. Hayward, L. O'Grady et al. 1989. Immunotoxicity studies of PCB (Aroclor 1254) in the adult rhesus (Macaca mulatta) monkey -- preliminary report. Int. J. Immunopharmacol. 11: 199-206. (e-copy in tox assessment folder) • Tryphonas, H., M.I. Luster, G. Schiffman et al. 1991a. Effect of chronic exposure of PCB (Aroclor 1254) on specific and nonspecific immune parameters in the rhesus (Macaca mulatta) monkey. Fund. Appl. Toxicol. 16(4): 773-786. (e-copy not available) • Tryphonas, H., M.I. Luster, K.L. White et al. 1991b. Effects of PCB (Aroclor 1254) on non-specific immune parameters in Rhesus (Macaca mulatta) monkeys. Int. J. Immunopharmacol. 13: 639-648. (e-copy in tox assessment folder) **Methods**: Groups of 16 adult female rhesus monkeys ingested gelatin capsules containing Aroclor 1254 (Monsanto Lot No. KA634) in 1:1 glycerol: corn oil vehicle daily at dosages of 0, 5, 20, 40 or 80 ug/kg-day for more than 5 years. The Aroclor mixture contained 5.19 ppm of polychlorinated dibenzofurans and undetectable		Complete

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
	(See IRIS for details) RD calculation date: 11/1/96. Per RD: (Note: RfD for Aroclor 1016 of 7E-5 is based on developmental effect - reduced birth weights in monkeys from a reproductive bioassay, however, use of this RfD does not result in lower soil direct contact criteria than criteria based on carcinogenic slope factor of 2.0). Per IRIS: Please check the following individual aroclor files for RfD assessments: Aroclor 1016, Aroclor 1248, and Aroclor 1254 (9/27/11; 6/25/13). IRIS	levels of polychlorinated dibenzo-p-dioxins (Truelove et al., 1990). At study initiation the monkeys were 11.1 +/- 4.1 years old (Tryphonas et al., 1991a, b; Arnold et al., 1993a, b). After 25 months of exposure the monkeys had achieved a pharmacokinetic steady-state based on PCB concentrations in adipose tissue and/or blood (Tryphonas et al., 1989). Results of general health and clinical pathology evaluations conducted during the first 37 months of exposure were reported by Arnold et al. (1993a, b). Results of immunologic assessments after 23 and 55 months of exposure were reported by Tryphonas et al. (1989, 1991a, b). Results of reproductive endocrinology evaluations after 24 or 29 months of exposure were reported by Truelove et al. (1990) and Arnold et al. (1993a). Effects on hydrocortisone levels during the first 22 months of exposure were reported by Loo et al. (1989) and Arnold et al. (1993b). All of the aforementioned evaluations were performed during the prebreeding phase of the study. Results of reproduction and histopathology evaluations in these monkeys are not fully available (Arnold, 1992). **Critical effect**: ocular exudate, inflamed and prominent Meibomian glands, distorted growth of finger and toe nails; decreased antibody (IgG and IgM) response to sheep erythrocytes **End point or Point of Departure (POD):** LOAEL = 0.005 mg/kg-day. NOAEL = none. **Uncertainty Factors**: UF = 300; A 10-fold factor is applied to account for sensitive individuals. A factor of 3 is applied to extrapolation from rhesus monkeys to humans. A full 10-fold factor for interspecies extrapolation is not considered necessary because of similarities in toxic responses and metabolism of PCBs between monkeys and humans and the general physiologic similarity between these species. A partial factor is applied for the use of a minimal LOAEL since the changes in the periocular tissues and nail bed see at the 0.05 mg/kg-day are not considered to be of marked severity. The duration of the critical study continued for approximately 25% of the lifespan of rhesus monkeys so that a reduced factor was used for extrapolation from subchronic exposure to a chronic RfD. The immunologic and clinical changes that were observed did not appear to be dependent upon duration which further justifies using a factor of 3 rather than 10 for extrapolation from subchronic to chronic, lifetime exposure.		

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
	RfD last revised 6/1/94.	**Source and date:** IRIS; 11/1/1996 (RfD for Aroclor 1254) **NOTE:** Per IRIS (11/1/1996); **Aroclor 1016 RfD = 7.0E-5 mg/kg-day. (Note: RfD for Aroclor 1016 of 7E-5 mg/kg-day is based on developmental effect (reduced birth weights in monkeys from a reproductive bioassay); however, use of this RfD does not protect for the effects from Aroclor 1254.** **NOTE:** Per IRIS (11/1/1996); Aroclor 1248: The health effects data for Aroclor 1248 were reviewed by the U.S. EPA RfD/RfC Work Group and determined to be inadequate for the derivation of an oral RfD. **Tier 2 Sources:** **PPRTV:** No PPRTV record available at this time. **MRL:** Per ATSDR (final 11/2000), **MRL = 0.02 µg/kg/day** (oral-chronic) as Aroclor 1254. Same as IRIS RfD. An addendum to the Tox Profile was released in 2011 however a modification to the chronic oral MRL (2000) was not made. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD (11/1/1996), RfD = 0.00002 mg/kg/day, same as IRIS for Aroclor 1254 basis. Per MDEQ-SWQ-CCD (6/1/1985) RfD = 0.0000275 mg/kg/day based on Aroclor 1248.		
Oral Cancer Slope Factor (CSF) (mg/kg-day)$^{-1}$)	2.0E+0	2.0E+0	IRIS, 1997 (CSF for PCBs CAS# 1336-36-3)	
CSF details	Per IRIS: The SF of 2.0E+0 per mg/kg/d is based on the occurrence of liver hepatocellular adenomas, carcinomas,	**Tier 1 Source:** **IRIS:** **Basis:** IRIS is a Tier 1 source. Per IRIS, an upper-bound slope factor of 2.0 per (mg/kg)/day is recommended for food early life exposure (among several other factors) for all mixtures and pathways vs a low risk and persistence upper bound slope factor of 0.4 per (mg/kg)/day. The CSF of 2.0 is selected primarily to address early life exposures for both residential and nonresidential land uses**.** **Critical Studies**:		Complete

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
	cholangiomas, or cholangiocarcinomas in female Sprague Dawley rats exposed to Aroclors in the diet (Brunner et al., 1996; Norback and Weltman, 1985). The cancer potency of PCB mixtures is determined using a tiered approach that depends on the information available. The IRIS SF represents an upper-bound SF for high risk and persistence. A September 1996 EPA support document is available. The IRIS SF was last revised: 6/1/97.	• Brunner, M.J., T.M. Sullivan, A.W. Singer, et. al. 1996. An assessment of the chronic toxicity and oncogenicity of Aroclor-1016, Aroclor-1242, Aroclor- 1254, and Aroclor-1260 administered in diet to rats. Study No. SC920192. Chronic toxicity and oncogenicity report. Battelle, Columbus OH. (e-copy not available) • Norback, D.H. and R.H. Weltman. 1985. Polychlorinated biphenyl induction of hepatocellular carcinoma in the Sprague-Dawley rat. Environ. Health Perspect. 60: 97-105.(e-copy in tox assessment folder) **Methods**: The CSF of 2.0E+0 per mg/kg-day is based on the occurrence of liver hepatocellular adenomas, carcinomas, cholangiomas, or cholangiocarcinomas in female Sprague Dawley rats exposed to Aroclors in the diet (Brunner et al., 1996; Norback and Weltman, 1985). The cancer potency of PCB mixtures is determined using a tiered approach that depends on the information available. The IRIS CSF represents an upper-bound SF for high risk and persistence. A September 1996 EPA support document is available. **Carcinogen Weight-of-Evidence (WOE) Class**: B2; probable human carcinogen **IRIS WOE Basis**: A 1996 study found liver tumors in female rats exposed to Aroclors 1260, 1254, 1242, and 1016, and in male rats exposed to 1260. These mixtures contain overlapping groups of congeners that, together, span the range of congeners most often found in environmental mixtures. Earlier studies found high, statistically significant incidences of liver tumors in rats ingesting Aroclor 1260 or Clophen A 60 (Kimbrough et al., 1975; Norback and Weltman, 1985; Schaeffer et al., 1984). Mechanistic studies are beginning to identify several congeners that have dioxin-like activity and may promote tumors by different modes of action. PCBs are absorbed through ingestion, inhalation, and dermal exposure, after which they are transported similarly through the circulation. This provides a reasonable basis for expecting similar internal effects from different routes of environmental exposure. Information on relative absorption rates suggests that differences in toxicity across exposure routes are small. The human studies are being updated; currently available evidence is inadequate, but suggestive. **Additional info:**		

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		Aroclor 1254: has not undergone a complete evaluation and determination. Aroclor 1248: has not undergone a complete evaluation and determination. Aroclor 1016: has not undergone a complete evaluation and determination. PCBs (1336-36-3) file (6/1/1997). **Source and Date**: IRIS; 6/1/1997 **Tier 2 Sources:** **PPRTV:** No PPRTV record available at this time. **MRL:** NA; MRLs are for non-cancer effects only. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD RRD (1/1/1986), CSF = 2 mg/kg/day.		
Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) (µg/m³)	--	NA	MDEQ, 2015	-
RfC/ITSL details	No AQD entry in EPB-CCD (9/27/11; 6/25/13). No PPRTV (11/28/11; 6/25/13).	**Tier 1 and 2 Sources:** **IRIS:** Per IRIS (RfD revision date 6/1/1994), no value at this time. **PPRTV:** No PPRTV record available at this time. **MRL:** Per ATSDR (final 11/2000), no inhalation value at this time. **Tier 3 Source:** **MDEQ:** Per MDEQ-CCD, no value at this time.		Complete
Inhalation Unit Risk Factor (IURF) ((µg/m^3)$^{-1}$)	6.0E-4	1.0E-4	IRIS, 1997	
IURF details	Per AQD: EPA's IRIS updated carcinogenicity assessment for polychlorinated	**Tier 1 Source:** **IRIS:** **Basis:** IRIS is a Tier 1 source. The unit risk value is based on the oral slope factor of 2 (mg/kg/day)$^{-1}$ **Critical Studies**:		Complete

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
	biphenyls. Based on the recent Brunner et al (1996), 2 yr. rat oral study. Sprague-Dawley rats were fed diets contain various Arochlors. Significant increases of liver adenomas or carcinomas were found in females with all Arochlors, and males with Aroclor 1260. The unit risk value is based on the oral slope factor of 2 (mg/kg)-1, EPA noted that differences between exposure routes are small. See EPA's IRIS printout for the range of other slope factors that may be possible to use in calculating	• Brunner, M.J., T.M. Sullivan, A.W. Singer, et. al. 1996. An assessment of the chronic toxicity and oncogenicity of Aroclor-1016, Aroclor-1242, Aroclor- 1254, and Aroclor-1260 administered in diet to rats. Study No. SC920192. Chronic toxicity and oncogenicity report. Battelle, Columbus OH. (e-copy not available) • Norback, D.H. and R.H. Weltman. 1985. Polychlorinated biphenyl induction of hepatocellular carcinoma in the Sprague-Dawley rat. Environ. Health Perspect. 60: 97-105.(e-copy in tox assessment folder) **Method(s)**: The CSF of 2.0E+0 per mg/kg/d is based on the occurrence of liver hepatocellular adenomas, carcinomas, cholangiomas, or cholangiocarcinomas in female Sprague Dawley rats exposed to Aroclors in the diet (Brunner et al., 1996; Norback and Weltman, 1985). The cancer potency of PCB mixtures is determined using a tiered approach that depends on the information available. The IRIS SF represents an upper-bound SF for high risk and persistence. A September 1996 EPA support document is available. 1) *Dose response data*: Liver hepatocellular adenomas, carcinomas, cholangiomas, or cholangiocarcinomas (same as RfD oral exposure route IRIS 6/1/1994) 2) *Extrapolation method*: Linear extrapolation below LED10s (U.S. EPA, 1996b) **Carcinogen Weight-of-Evidence (WOE) Class**: B2; probable human carcinogen **IRIS WOE Basis**: A 1996 study found liver tumors in female rats exposed to Aroclors 1260, 1254, 1242, and 1016, and in male rats exposed to 1260. These mixtures contain overlapping groups of congeners that, together, span the range of congeners most often found in environmental mixtures. Earlier studies found high, statistically significant incidences of liver tumors in rats ingesting Aroclor 1260 or Clophen A 60 (Kimbrough et al., 1975; Norback and Weltman, 1985; Schaeffer et al., 1984). Mechanistic studies are beginning to identify several congeners that have dioxin-like activity and may promote tumors by different modes of action. PCBs are absorbed through ingestion, inhalation, and dermal exposure, after which they are transported similarly through the circulation. This provides a reasonable basis for expecting similar internal effects from different		

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
	different screening levels. AQD calculation date: 10/1/96.	routes of environmental exposure. Information on relative absorption rates suggests that differences in toxicity across exposure routes are small. The human studies are being updated; currently available evidence is inadequate, but suggestive. **Source and Date**: IRIS; 6/1/1997 **Tier 2 Sources:** **PPRTV:** No PPRTV record available at this time. **MRL:** NA; MRLs are for non-cancer effects only. **Tier 3 Source:** **MDEQ:** Per MDEQ-AQD-CCD (10/1/1996), **AQD IURF = 0.0006 µg/m^3**. EPA's IRIS updated carcinogenicity assessment for polychlorinated biphenyls. Based on the recent Brunner et al (1996), 2-year rat oral study. Sprague-Dawley rats were fed diets contain various Arochlors. Significant increases of liver adenomas or carcinomas were found in females with all Arochlors, and males with Aroclor 1260. The unit risk value is based on the oral slope factor of 2 (mg/kg)$^{-1}$, EPA noted that differences between exposure routes are small. See EPA's IRIS printout for the range of other slope factors that may be possible to use in calculating different screening levels.		
Mutagenic Mode of Action (MMOA)? (Y/N)	--	NO	USEPA, 2015	
MMOA Details	--	Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List.		
Developmental or Reproductive Effector? (Y/N)	No	Yes- oral exposure (2.0E-5 mg/kg-day). No- inhalation exposure Oral Exposure Pathways- Full Term Exposure		
Developmental or Reproductive Toxicity Details	--	**NOTE:** Per IRIS (11/1/1996); Aroclor 1016 RfD = 7.0E-5 mg/kg-day. (Note: RfD for Aroclor 1016 of 7E-5 mg/kg-day is based on developmental effect - reduced birth weights in monkeys from a reproductive bioassay, however, use of this RfD does not protect for the effects from Aroclor 1254 SO use 2.0E-5 and consider it protective of developmental effects. See RfD sections as several critical studies		

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		are reported.		
State Drinking Water Standard (SDWS) (µg/L)	0.0005	0.5	SDWA, 1976	
SDWS details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399		
Secondary Maximum Contaminant Level (SMCL) (µg/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? (Y/N)	NO	Not evaluated.	NA	
Aesthetic value details	NA	NA		
Is there a Phytotoxicity Value? (Y/N)	NO	Not evaluated.	NA	
Phytotoxicity details	NA	NA		
Others:				

(C) Chemical-specific Absorption Factors

	Part 201 Value	Update	Source/Reference/ Dates	Comments/Notes /Issues
Gastrointestinal absorption efficiency value (ABSgi)	---	1.0	MDEQ, 2015/USEPA RAGS-E, 2004	
ABSgi details		RAGS E (USEPA, 2004) Default Value		
Skin absorption efficiency value (AEd)	---	0.14	MDEQ, 2015	
AEd details				
Ingestion Absorption Efficiency (AEi)		0.5	MDEQ, 2015	
AEi Details				
Relative Source Contribution for Water (RSC_W)		0.2	MDEQ, 2015	
Relative Source Contribution for Soil (RSC_S)		1.0	MDEQ, 2015	
Relative Source Contribution for Air (RSC_A)		1.0	MDEQ, 2015	
Others				

(D) Rule 57 Water Quality Values and GSI Criteria

Current GSI value (μg/L)	0.2 (M); 0.000026
Updated GSI value (μg/L)	0.2 (M); 0.000026
Rule 57 Drinking Water Value (μg/L)	0.2 (M); 0.000026

	Rule 57 Value (μg/L)	Verification Date
Human Non-cancer Values- Drinking water source (HNV-drink)	NLS	
Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)	NLS	
Wildlife Value (WV)	0.00012	7/1997
Human Cancer Values for Drinking Water Source (HCV-drink)	0.000026	7/1997
Human Cancer values for non-drinking water source (HCV-Non-drink)	0.000026	7/1997
Final Chronic Value (FCV)	ID* (0.000026)	6/1997
Aquatic maximum value (AMV)	ID	6/1997
Final Acute Value (FAV)	ID	6/1997

Sources:

1. MDEQ Surface Water Assessment Section Rule 57 website
2. MDEQ Rule 57 table

(E) Target Detection Limits (TDL)

	Value	Source
Target Detection Limit – Soil (μg/kg)	330	MDEQ, 2015
Target Detection Limit – Water (μg/L)	0.2	MDEQ, 2015
Target Detection Limit – Air (ppbv)	3.90E-03	MDEQ, 2015
Target Detection Limit – Soil Gas (ppbv)	1.30E-01	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