



CHEMICAL UPDATE WORKSHEET

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|-----------------------|----------------------------|
| Chemical Name: | 1,2-Dichloropropane |
| CAS #: | 78-87-5 |
| Revised By: | RRD Toxicology Unit |
| Revision Date: | September 16, 2015 |

(A) Chemical-Physical Properties

| | Part 201 Value | Updated Value | Reference Source | Comments |
|----------------------------------------------------------|-----------------------|----------------------|-------------------------|-----------------|
| Molecular Weight (g/mol) | 112.99 | 112.99 | EPI | EXP |
| Physical State at ambient temp | Liquid | Liquid | MDEQ | |
| Melting Point (°C) | 203 | -100.00 | EPI | EXP |
| Boiling Point (°C) | 95.5 | 95.50 | EPI | EXP |
| Solubility (ug/L) | 2.80E+6 | 2.800E+06 | EPI | EXP |
| Vapor Pressure (mmHg at 25°C) | 50.92 | 5.33E+01 | EPI | EXP |
| HLC (atm-m³/mol at 25°C) | 2.80E-3 | 2.82E-03 | EPI | EXP |
| Log Kow (log P; octanol-water) | 1.97 | 1.98 | EPI | EXP |
| Koc (organic carbon; L/Kg) | 43.5 | 60.7 | EPI | EST |
| Ionizing Koc (L/kg) | | NR | NA | NA |
| Diffusivity in Air (Di; cm²/s) | 0.0782 | 7.33E-02 | W9 | EST |
| Diffusivity in Water (Dw; cm²/s) | 8.73E-6 | 9.7101E-06 | W9 | EST |
| Soil Water Partition Coefficient (Kd; inorganics) | NR | NR | NA | NA |

| | Part 201 Value | Updated Value | Reference Source | Comments |
|----------------------------------------------------------|----------------|---------------|------------------|----------|
| Flash Point (°C) | 60 F | 21 | CRC | EXP |
| Lower Explosivity Level (LEL; unit less) | 0.034 | 0.034 | CRC | EXP |
| Critical Temperature (K) | | 5.72E+02 | EPA2004 | EXP |
| Enthalpy of Vaporization (cal/mol) | | 7.59E+03 | EPA2004 | EXP |
| Density (g/mL, g/cm ³) | | 1.156 | CRC | EXP |
| EMSOFT Flux Residential 2 m (mg/day/cm ²) | 2.59E-05 | 2.74E-05 | EMSOFT | EST |
| EMSOFT Flux Residential 5 m (mg/day/cm ²) | 5.94E-05 | 6.47E-05 | EMSOFT | EST |
| EMSOFT Flux Nonresidential 2 m (mg/day/cm ²) | 3.66E-05 | 4.34E-05 | EMSOFT | EST |
| EMSOFT Flux Nonresidential 5 m (mg/day/cm ²) | 8.24E-05 | 1.01E-04 | EMSOFT | EST |

(B) Toxicity Values/Benchmarks

| | Part 201 Value | Updated Value | Source*/Reference /Date | Comments/Notes /Issues |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------|
| Reference Dose (RfD) (mg/kg/day) | 0.44 | 9.0E-2 | ATSDR, 1989 | |
| RfD details | NOAEL of 62 mg/kg (44 mg/kg/d) in male F344/N rats dosed by gavage, 5 days/week for 103 weeks (UF=100) (NTP, 1986). CCD-WRD Date: 4/17/1997 | <p>Tier 2 Source: ATSDR: Basis: ATSDR is best available chronic value. Tier 3 source MDEQ (1997) RfD = 4.4E-1 mg/kg-day is based on the same study but the critical effect used and UF values are different (see details below). ATSDR chronic oral MRL = 0.09 (9.0E-2) mg/kg-day based on hepatic effect. Critical Study: NTP (National Toxicology Program). 1986. Toxicology and Carcinogenesis studies of 1,2-dichloropropane (Propylene dichloride) (CAS No. 78-87-5) in F344/N rats and B6C3F1 mice (gavage studies). TR-263, NIH Publication No. 86-2519. National Toxicology Program, Research Triangle Park, NC. Methods: Groups of 50 female rats (F344/N) and 50 male and female mice (B6C3F1) were exposed to 1,2-dichloropropane at doses 0, 125, and 250 mg/kg/day, and groups of 50 male rats at doses 0, 62, and 125 mg/kg/day in corn oil by gavage 5 days/week for 103 weeks. Critical effect: hepatic necrosis End point or Point of Departure (POD): LOAEL = 125 mg/kg-day in mice (Dose adjusted for continuous exposure) Uncertainty Factors: UF = 1,000 (10 each for intraspecies variability, interspecies extrapolation, and use of a LOAEL) Source and date: ATSDR, 12/1989; ATSDR Toxicological Profile (Table 2-2)</p> <p>Tier 1 and 2 Sources: IRIS: Per IRIS (12/01/1991), no value at this time. PPRTV: Per PPRTV (11/30/2003), no value at this time. MRL: Per ATSDR (12/1989), intermediate oral MRL = 0.07 (7.0E-2) mg/kg-day. See derivation below. An acute oral MRL = 0.1 mg/kg-day is also available based on CNS depression (Bruckner et. Al, 1989, 1,5, 10-day study) and UF = 1,000. Critical Study: Bruckner JV, MacKenzie, WF, Ramanathan R, et al. 1989. Oral toxicity of 1,2-dichloropropane: Acute short-term and long-term studies in rats.</p> | | Complete |



| | Part 201 Value | Updated Value | Source*/Reference /Date | Comments/Notes /Issues |
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| | | <p>Fund Appl Toxicol 12:713-730. Method(s): Rats were exposed to 100, 250, 500 or 750 mg/kg-day 1,2-dichloropropane 5 days/ wk for 13 weeks. Critical effect: anemia in rats End point or Point of Departure (POD): LOAEL = 100 mg/kg-day (dose adjusted for intermittent exposure) Uncertainty Factors: UF = 1,000 (10 each for intraspecies variability, interspecies extrapolation, and use of a LOAEL) Source and date: ATSDR, 12/1989</p> <p>Tier 3 Source: MDEQ: Per MDEQ/WRD (4/17/1997), RfD = 4.4E-1 mg/kg-day Critical Study: NTP (National Toxicology Program). 1986. Toxicology and Carcinogenesis studies of 1,2-dichloropropane (Propylene dichloride) (CAS No. 78-87-5) in F344/N rats and B6C3F1 mice (gavage studies). TR-263, NIH Publication No. 86-2519. National Toxicology Program, Research Triangle Park, NC. Methods: Groups of 50 female rats (F344/N) and 50 male and female mice (B6C3F1) were exposed to 1,2-dichloropropane at doses 0, 125, and 250 mg/kg/day, and groups of 50 male rats at doses 0, 62, and 125 mg/kg/day in corn oil by gavage 5 days/week for 103 weeks. Critical effect: decreased body weight End point or Point of Departure (POD): NOAEL = 62 mg/kg (44 mg/kg-d) in male F344/N rats Uncertainty Factors: UF = 100 (10 each for intraspecies variability and interspecies extrapolation) Source and date: MDEQ-CCD/WRD, 4/17/1997.</p> | | |
| Oral Cancer Slope Factor (CSF) ((mg/kg-day)⁻¹) | 0.037 | 3.6E-2 | CALEPA, 1999/MDEQ, 1997 | |
| CSF details | Hepatic carcinomas/ adenomas in male B6C3F1 mice dosed by gavage, | <p>Tier 3 Sources: CALEPA/MDEQ: Basis: CALEPA (1999) value is based on a newer assessment that used new methodology based on the LED10 to derive the potency estimate. MDEQ (1997) used Global 82 method and revised species scaling factor to derive the value.</p> | | Complete |



| | Part 201 Value | Updated Value | Source*/Reference /Date | Comments/Notes /Issues |
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| | <p>5 days/week for 103 weeks and examined at approximately week 106. Fifty, 47 and 50 animals in the control, low and high dose groups, respectively were studied (NTP, 1986). (Note: dose levels in mg/kg-day are not cited). Revised species scaling factor of (BWh/BWa) to the 0.25 power used for q* calculation. CCD date: 1/13/2000</p> | <p>Both used the NTP (1986) data. HEAST (1993) used the same study; however, estimation details are not available. New Jersey and Texas used the HEAST value. Minnesota adopted the CA-EPA value. See details below.</p> <p>Tier 1 and 2 Sources: IRIS: Per IRIS (12/01/1991), no value at this time. PPRTV: Per PPRTV (11/30/2003), no value at this time. MRL: NA; MRLs are for non-cancer effects only.</p> <p>Tier 3 Sources: MDEQ: Per DEQ-CCD/WRD (4/17/1997), CSF = 3.7E-2 (mg/kg-day)⁻¹. Critical Study: NTP (National Toxicology Program). 1986. Toxicology and Carcinogenesis studies of 1,2-dichloropropane (Propylene dichloride) (CAS No. 78-87-5) in F344/N rats and B6C3F1 mice (gavage studies). TR-263, NIH Publication No. 86-2519. National Toxicology Program, Research Triangle Park, NC. Methods: 1,2-dichloropropane were administered to female rats and male and female mice at doses 0, 125, and 250 mg/kg/day, and to male rats at doses 0, 62, and 125 mg/kg/day in corn oil by gavage 5 days/week for 103 weeks. 1) <i>Dose response data: Tumor Type</i> - Hepatic carcinomas/adenomas in male B6C3F1 mice; <i>Test Species</i> - male B6C3F1 mice; <i>Route</i> – oral (gavage) 2) <i>Extrapolation method:</i> linear; Revised species scaling factor of (BWh/BWa) to the 0.25 power used for q* calculation Source and Date: MDEQ-CCD/WRD, 4/17/1997</p> <p>HEAST: CSF= 6.8E-2 (mg/kg-day)⁻¹. Key Study: (005062). NTP. 1986. NTP Technical Report on the Carcinogenesis Studies of 1.2-Dichloropropane (Propylene Dichloride) In F344/N Rats And B6c3f1 Mice (Gavage Studies). Ntp-82-092. Nih Publ No 84-2519. Ntp Tr 263. Us Dhhs. Phs, Nih. August. 1986 Draft. Methods: F344/N rats and B6CF1 mice, oral gavage F344/N rats (50/sex/group) received 1.2-Dichloropropane in corn oil by gavage five days/week for 103 weeks. Male rats received 0, 62 or 125 mg/kg (averaged</p> | | |

| | Part 201 Value | Updated Value | Source*/Reference /Date | Comments/Notes /Issues |
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| | | <p>over seven days/week these doses equal 0, 44.3 and 89.3 mg/kg-day, respectively). Female rats received 0, 125 or 250 mg/kg (0, 89.3 and 178.6 mg/kg-day, respectively).</p> <p>Tumor type: liver tumors in mouse Source: HEAST Summary 1997</p> <p>California DTSC: CSF= 0.036 or 3.6E-2 (mg/kg-day)⁻¹. Key study: NTP (1986). Toxicology and carcinogenesis studies of 1,2-dichloropropane (propylene dichloride) (CAS No. 78-87-5) in F344/N rats and B6C3F1 mice (gavage studies). National Toxicology Program Technical Report Series No. 263. NIH Publication No. 86-2519. Method: 1,2-DCP was administered to F344/N rats (50/sex/group) in corn oil by gavage five days/week for 103 weeks. Male rats received 0, 62 or 125 mg/kg (averaged over seven days/week these doses equal 0, 44.3 and 89.3 mg/kg-day, respectively). Female rats received 0, 125 or 250 mg/kg (0, 89.3 and 178.6 mg/kg-day, respectively). Calculation: The most sensitive site, gender and species for tumor development from 1,2-DCP was the combined incidence of hepatocellular adenomas and carcinomas observed in male mice in the NTP (1986) bioassay. The p-value of the least squares coefficient indicates a reasonable fit of the model polynomial to this experimental dataset. The CSF_{human} calculated from this dataset is 3.6x10⁻² (mg/kg-day)⁻¹. Note: Potency estimates were calculated using the LMS model and the new method based on the LED10. The estimates from these two methodologies were consistent: 3.8 x 10⁻² (mg/kg-day)⁻¹ and 3.6 x 10⁻² (mg/kg-day)⁻¹. Source: OEHHA 1999. Public Health Goal for 1, 2-Dichloropropane in Drinking Water, 1999.</p> <p>Minnesota PCA: CSF= 3.6E-2 (mg/kg-day)⁻¹ based on CA-EPA. New Jersey DEP: CSF= 6.8E-2 (mg/kg-day)⁻¹ based on HEAST.</p> | | |



| | Part 201 Value | Updated Value | Source*/Reference /Date | Comments/Notes /Issues |
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| | | <p>Texas CEQ: CSF= 6.8E-02 (mg/kg-day)⁻¹ based on HEAST.</p> <p>Other Tier 3: No value is available at this time from these Tier 3 sources/databases: NTP ROC, health and environmental agencies of Massachusetts and New York, WHO (IARC), WHO (IPCS/INCHEM), Canada, The Netherlands (RIVM), ECHA (REACH) and OECD HPV.</p> | | |
| Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) (µg/m³) | 4.0 | 4.0E+0 | IRIS, 1991 | |
| RfC/ITSL details | Propylene dichloride; Based on USEPA's RfC from Nitschke et al 1988 13 week rat inhalation LOAEL of 1.3 mg/m ³ . CCD-AQD date: 7/17/1991 | <p>Tier 1 Source: IRIS: Basis: IRIS is a Tier 1 source and ATSDR (1989) intermediate MRL is based on an older assessment. IRIS (1991) RfC = 4.0E-3 mg/m³. Critical Study: Nitschke K.D., K.A. Johnson, D.L. Wackerle, J.E. Phillips and D.A. Dittenber. 1988. Propylene dichloride: A 13-week inhalation toxicity study with rats, mice, and rabbits. Dow Chemical Company, Mammalian and Environmental Toxicology Research Laboratory, Midland, MI. OTS Doc. #86-870001397 Methods: F344 and B6C3F1 mice (10/sex/group) were exposed to 0, 15, 50, or 150 ppm dichloropropane (0, 69.3, 231, or 693 mg/m³) for 6 hours/day, 5 days/week for 13 weeks (duration-adjusted concentrations = 0, 12.4, 41.3, and 124 mg/m³). New Zealand rabbits (7/sex/group) were exposed to 0, 150, 500, or 1000 ppm (0, 693, 2310, or 4621 mg/m³) according to the same regimen (duration-adjusted concentrations = 0, 124, 413, and 825 mg/m³). Critical effect: hyperplasia of the nasal mucosa End point or Point of Departure (POD): LOAEL = 69.3 mg/m³ (15 ppm); LOAEL_{ADJ-HEC})= 1.3 mg/m³ Uncertainty Factors: UF = 300; The uncertainty factor of 300 reflects a factor of 10 to protect sensitive individuals. A factor of 3 is used for extrapolation from a subchronic study, since study of the critical effect shows little progression with</p> | | Complete |



| | Part 201 Value | Updated Value | Source*/Reference /Date | Comments/Notes /Issues |
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| | | <p>exposure time. A factor of 3 is used for the use of a minimal LOAEL due to the minimal nature of the effect. A factor of 3 is used for interspecies extrapolation due to the use of dosimetric adjustments. The factors of 3 represent operational application of a geometric half of the standard factor of 10, rounded to a single significant figure. As a result, multiplication of 3 factors of 3 results in a composite factor of 30.</p> <p>Source and date: IRIS, Last revision date – 12/01/1991</p> <p>Tier 2 Sources: PPRTV: PPRTV (11/30/2003) did not evaluate RfC. MRL: Per ATSDR (12/1989), no chronic inhalation MRL. Intermediate inhalation MRL = 0.007 ppm (3.2E-2 mg/m³) (MW = 112.99 g/mol): Critical Study: Nitschke K.D., K.A. Johnson, D.L. Wackerle, J.E. Phillips and D.A. Dittenber. 1988. Propylene dichloride: A 13-week inhalation toxicity study with rats, mice, and rabbits. Dow Chemical Company, Mammalian and Environmental Toxicology Research Laboratory, Midland, MI. OTS Doc. #86-870001397 Methods: F344 and B6C3F1 mice (10/sex/group) were exposed to 0, 15, 50, or 150 ppm dichloropropane (0, 69.3, 231, or 693 mg/m³) for 6 hours/day, 5 days/week for 13 weeks (duration-adjusted concentrations = 0, 12.4, 41.3, and 124 mg/m³). New Zealand rabbits (7/sex/group) were exposed to 0, 150, 500, or 1000 ppm (0, 693, 2310, or 4621 mg/m³) according to the same regimen (duration-adjusted concentrations = 0, 124, 413, and 825 mg/m³). Critical effect: upper respiratory lesions in rat End point or Point of Departure (POD): LOAEL = 15 ppm Uncertainty Factors: UF = 1,000 (10 each for intraspecies variability, interspecies extrapolation, and use of a LOAEL) Source and date: ATSDR, 12/1989; ATSDR Toxicological Profile (Table 2-1)</p> <p>Tier 3 Source: MDEQ: Per DEQ-CCD, AQD (7/17/1991) adopted IRIS. RfC = 4 µg/m³, averaging time = 24 hours.</p> | | |
| Inhalation Unit Risk Factor | -- | 5.0E-6 | MDEQ, 2013 | |



| | Part 201 Value | Updated Value | Source*/Reference /Date | Comments/Notes /Issues |
|------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------|
| (IURF) (($\mu\text{g}/\text{m}^3$) ⁻¹) | | | | |
| IURF details | NA | <p>Tier 3 Source: MDEQ: Basis: MDEQ (2013) value is a newer assessment and used a recent 2-year inhalation carcinogenicity and toxicity study (Umeda et al., 2010). California (2002) is based on extrapolated oral data. Minnesota and New Jersey adopted the California value. See details below.</p> <p>Carcinogen Weight-of-Evidence (WOE) Class: Per PPRTV (11/30/2003), the only relevant inhalation study (Heppel et al., 1948) was inadequate to evaluate the carcinogenicity of 1,2-dichloro-propane.</p> <p>Tier 1 and 2 Sources: IRIS: Per IRIS (12/01/1991), no value at this time. PPRTV: Per PPRTV (11/30/2003), no value at this time. The only relevant inhalation study (Heppel et al., 1948) was inadequate to evaluate carcinogenicity. MRL: NA; MRLs are for non-cancer effects only.</p> <p>Tier 3 Sources: MDEQ-AQD: IURF = 5.0E-6 ($\mu\text{g}/\text{m}^3$)⁻¹: Critical Study: Umeda Y1, Matsumoto M, Aiso S, Nishizawa T, Nagano K, Arito H, Fukushima S. 2010. Inhalation carcinogenicity and toxicity of 1,2-dichloropropane in male and female F344 rats. Inhalation Toxicology: International Forum for Respiratory Research. 22: 1116-1126 Inhalation carcinogenicity and toxicity of 1,2-dichloropropane in rats. Methods: male and female F344 rats were exposed to DCP for either 13 wk or 2 years. In the 13-wk study, the DCP concentrations used were 125, 250, 500, 1000, or 2000 ppm (v/v), and in the 2-year study the DCP concentrations were 80, 200, or 500 ppm (v/v). Thirteen-week exposure to DCP induced hyperplasia in the respiratory epithelium and atrophy of the olfactory epithelium at 125 ppm and above. Two-year exposure to DCP significantly increased incidences of papilloma in the nasal cavity of male and female rats exposed to 500 ppm DCP. In addition,</p> | Complete | |



| | Part 201 Value | Updated Value | Source*/Reference /Date | Comments/Notes /Issues |
|-------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------|
| | | <p>three cases of esthesioneuroepithelioma were observed in the DCP-exposed male rats. <i>Dose response data: Tumor Type – nasal tumors; Test Species - male rats</i> Source and Date: DEQ-CCD/AQD (9/18/2013)</p> <p>California OEHHA: IURF = 1.0E-5 (µg/m³)⁻¹ based on route to route extrapolation (2/15/2013 email): 0.036 * (0.2/70) = 1.0E-05. Refer to CSF Updated Value for details. Source: OEHHA 1999. Public Health Goal for 1, 2-Dichloropropane in Drinking Water, 1999.</p> <p>Minnesota PCA: IURF = 1.0E-5 (µg/m³)⁻¹ based on CALEPA.</p> <p>New Jersey DEP: IURF = 1.0E-5 (µg/m³)⁻¹ based on CALEPA.</p> <p>Other Tier 3: No value is available at this time from these Tier 3 sources/databases: HEAST, NTP ROC, health and environmental agencies of Massachusetts, New York, and Texas, WHO (IARC), WHO (IPCS/INCHEM), Canada, The Netherlands (RIVM), ECHA (REACH) and OECD HPV.</p> | | |
| Mutagenic Mode of Action (MMOA)? (Y/N) | -- | NO | USEPA, 2015 | |
| MMOA Details | -- | <p>NA Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List.</p> | | |
| Developmental or Reproductive Effector? (Y/N) | No | No, the RfD or RfC/ITSL is not based on a reproductive-developmental effect. | MDEQ, 2015 | |
| Developmental or Reproductive Toxicity Details | NA | NA | | |
| State Drinking Water Standard (SDWS) (ug/L) | 5.0 | 5.0 | SDWA, 1976L Lists | |



| | Part 201 Value | Updated Value | Source*/Reference /Date | Comments/Notes /Issues |
|--------------------------------------------------------------|----------------|---------------------------------------------------------------------------------|-------------------------|------------------------|
| SDWS details | SDWA, 1976 | MI Safe Drinking Water Act (SDWA) 1976 PA 399 | | |
| Secondary Maximum Contaminant Level (SMCL) (ug/L) | -- | NO | USEPA SMCL List, 2015 | |
| SMCL details | NA | MI Safe Drinking Water Act (SDWA) 1976 PA 399 and USEPA MCL and SMCL List, 2015 | | |
| Is there an aesthetic value for drinking water? (Y/N) | NO | Not evaluated. | NA | |
| Aesthetic value (ug/L) | NA | NA | NA | |
| Aesthetic Value details | NA | NA | | |
| Phytotoxicity Value? (Y/N) | NO | Not evaluated. | NA | |
| Phytotoxicity details | NA | NA | NA | |
| Others | | | | |

(C) Chemical-specific Absorption Factors

| | Part 201 Value | Update | Source/Reference/ Dates | Comments/Notes /Issues |
|-------------------------------------------------------------------|----------------|----------------------------------|----------------------------|---------------------------|
| Gastrointestinal absorption efficiency value (ABS _{gi}) | --- | 1.0 | MDEQ, 2015 | |
| ABS _{gi} details | | RAGS E (EPA, 2004) Default Value | | |
| Skin absorption efficiency value (AE _d) | --- | 0.1 | MDEQ, 2015 | |
| AE _d details | | | | |
| Ingestion Absorption Efficiency (AE _i) | | 1.0 | MDEQ, 2015 | |
| AE _i 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) | 230 (X) |
| Updated GSI value (µg/L) | 230 (X) |
| Rule 57 Drinking Water Value (µg/L) | 9.1 |

| | Rule 57 Value (µg/L) | Verification Date |
|----------------------------------------------------------------------------|-----------------------------|--------------------------|
| Human Non-cancer Values- Drinking water source (HNV-drink) | 12,000 | 9/2003 |
| Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink) | 380,000 | 9/2003 |
| Wildlife Value (WV) | NA | NA |
| Human Cancer Values for Drinking Water Source (HCV-drink) | 9.1 | 9/2003 |
| Human Cancer values for non-drinking water source (HCV-Non-drink) | 290 | 9/2003 |
| Final Chronic Value (FCV) | 230 | 9/2003 |
| Aquatic maximum value (AMV) | 2,000 | 9/2003 |
| Final Acute Value (FAV) | 4,000 | 9/2003 |

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 ($\mu\text{g}/\text{kg}$) | 50 | MDEQ, 2015 |
| Target Detection Limit – Water ($\mu\text{g}/\text{L}$) | 1 | MDEQ, 2015 |
| Target Detection Limit – Air (ppbv) | 8.60E-01 | MDEQ, 2015 |
| Target Detection Limit – Soil Gas (ppbv) | 2.90E+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 |