**Exposure Assessment Worksheet**

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| --- | --- | --- |
| Chemical Name: | Dichloroacetic Acid | |
| CAS number: | 79-43-6 | |
| Review Type: | CEC |  |

**Some useful links:**

[EPA CompTox Chemistry Dashboard](https://comptox.epa.gov/dashboard/)—Fate/transport, exposure estimates, chemical uses, and more

MDA monitoring of Agricultural Chemicals (including annual monitoring reports): <http://www.mda.state.mn.us/chemicals/pesticides/maace.aspx>

USDA PDP (pesticide data, including food residues): <http://www.ams.usda.gov/AMSv1.0/pdp>

Occurrence studies by USGS and others: See O:\HRA\COMMON\DWCEC\Relevant data

[TOXNET](http://toxnet.nlm.nih.gov/index.html) (Chemical data; go to HSDB for chemical properties and related info.)

[PubMed (NIH/NLM)](http://www.ncbi.nlm.nih.gov/pubmed/) (search for journal articles)

[ATSDR](http://www.atsdr.cdc.gov/) (Tox profiles, often include exposure information as well)

[EPA Toxics Release Inventory](http://www.epa.gov/triexplorer/) (industrial chemical releases)

EPA - [Pharm & Personal care products in water](http://www.epa.gov/waterscience/ppcp/);

EPA - [Chemicals in sewage sludge](http://www.epa.gov/waterscience/biosolids/tnsss-fs.html);

[USGS Stream Survey – organics, pharm., hormones, 1999-2000](http://toxics.usgs.gov/pubs/OFR-02-94/index.html);

[EPA HPV Challenge Program](http://www.epa.gov/hpv/pubs/summaries/viewsrch.htm) (reviews of high production volume chemicals)

EPA Clu-In Emerging Contaminant Fact Sheets: <http://clu-in.org/emergingcontaminants/#706>

NLM ChemID Plus (good for chemical identity and properties): <http://chem.sis.nlm.nih.gov/chemidplus/>

Pesticide registration status and documentation: <http://www.epa.gov/opp00001/reregistration/status.htm>

Pharmaceutical label information: <http://dailymed.nlm.nih.gov/dailymed/about.cfm>

Food additives: <http://www.accessdata.fda.gov/scripts/fcn/fcnNavigation.cfm?rpt=eafusListing>

Cosmetics and Fragrances: <http://www.cir-safety.org/>

NOAA – monitoring of pharmaceuticals in the environment - <http://products.coastalscience.noaa.gov/peiar/>

**1. Chemical Identity.**

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| **Chemical Synonyms** | Dichlorethanoic Acid  Bichloracetic Acid  Urner's liquid |
| **Chemical Uses** | “Haloacetic acids ... are chemical byproducts of chlorination and chloramination of drinking water.” (HSDB)  “Chloroacetic acid's formation as a chemical byproduct of chlorination and chloramination of drinking water, and its use as a herbicide and in the manufacture of various dyes and other organic chemicals may result in its release to the environment through various waste streams..” (HSDB)  Used in production of organic chemicals, including pharmaceuticals (HSDB)  Used as an herbicide (HSDB)  From EPA Chem Dashboard: |
| **Industrial/Commercial** | (known uses of this chemical in industrial or commercial settings) |
| **Agricultural** | (pesticide, fertilizer, or veterinary uses)  “used in the … preparation of iron chelates in the agricultural sector.” (HSDB)  EPA chem dashboard: 4 products as pesticide inert ingredient, 2 products as “pesticide.”  Not listed in MDA pesticide sales database (dichloroacetic acid is listed.) |
| **Consumer (personal care)** |  |
| **Consumer (pharmaceutical)** | “Used in the synthesis of chloramphenicol and allantoin. **Dichloroacetic acid** has virucidal and fungicidal activity. It was found to be active against several staphylococci.[Morris ED, Bost JC; Kirk-Othmer Encyclopedia of Chemical Technology. (2001). NY, NY: John Wiley & Sons; Acetic Acid, Halogenated Derivatives. Online Posting Date: July 19, 2002.] \*\*PEER REVIEWED\*\*” (HSDB)  Used as a test reagent for analytical measurements during fiber manufacture [poly(ethylene terephthalate)] and as a medicinal disinfectant (substitute for formalin |
| **Consumer (food)** |  |
| **Consumer (other)** |  |
| **Are uses in Minnesota comparable to uses in other states?** |  |
| **1a. Any major new or expanded uses that could increase exposure? (recent or future changes)** | Describe new uses or trends. Check box if you think this should be factored into chemical ranking for selection for full review. |
| **1b. Any anticipated decreases in exposure due to recent or upcoming decreased use or regulations/bans?** | Describe trends or regulations that could reduce exposure. Check box if you think this should be factored into chemical ranking for selection for full review. |
| **Production Data** |  |
| **Naturally Occurring?** |  |
| **Manufacturing** | (any known manufacturing sites that would release to Minnesota waters) |
| **Processing** | (any known processing sites where this chemical might be processed, repackaged, etc., creating potential releases) |
|  |  |
| **Key messages for Information Sheet** | **Chemical Identity, Chemical Uses**  Dichloroacetic Acid is a chemical byproduct of drinking water treatment, forming during the chlorination stage of treatment. [Source: HSDB] It is also used in industry in the creation of other chemicals. It has been used as an herbicide in Minnesota as recently as 2013 (no more recent data available.) [source: MDA pesticide sales database] |
| **Potential Issues/Concerns or Unresolved Questions** |  |
| **Secondary Reviewer questions/observations** | (note any disagreements/additions/corrections) |

**2. Chemical Data.**

**(key source:** [**TOXNET/HSDB**](https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm)**)**

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| --- | --- | --- | --- | --- |
| **Parameter** | **Value** | **Units** | **Source** |  |
| **2.1 Koc (log)**  Low mobility : log Koc>4.  Medium :log Koc 2 to 4.  High : log Koc<2 | 1.87  1.87 | Log  log | Calc from Koc  HSDB | Can be estimated from Kow : see below.  Discuss sorption to sludge/soil/sediment.  High mobility |
| **2.2 Biodegradation half-life**  Low: <2 days  Medium: 2 days – 2 mos.  High: >2 months | EPA Chem Dashboard: 6.69 days (modeled value)  HSDB: “AEROBIC: The biodegradability of dichloroacetic acid, at 10 ppm, was measured in both river water and seawater using the cultivation method; 14 and 8% degradation was reported for river water and seawater, respectively, after 3 days incubation(1). Based on these results, this compound was determined to be difficult to degrade(1). 0, 27, and 68% of the theoretical BOD in a BOD test was reached in 2, 5, and 10 days, respectively, following inoculation with sewage(2). Dichloroacetic acid was not biodegraded during a 5 day BOD test using a sewage inoculum(3). Dichloroacetic acid at 20 mg/L was >95% degraded in a 20 day BOD test; in a second screening test, this compound was 83% degraded after 30 days(4). Dichloroacetic acid, present at 100 mg/L, reached 97% of its theoretical BOD in 2 weeks using an activated sludge inoculum at 30 mg/L in the Japanese MITI test(5). Pure culture experiments show that aerobic degradation occurs via dehalogenation(6).[(1) Kondo M et al; Eisei Kagaku 34: 188-95 (1988) (2) Dias FF, Alexander M; Appl Microbiol 22: 1114-18 (1971) (3) Heukelekian H, Rand MC; J Water Pollut Contr Assoc 29: 1040-53 (1955) (4) Popp KH; GWP, Gaswasserfach: Wasser/Abwasser 126: 286-92 (1985) (5) NITE; Chemical Risk Information Platform (CHRIP). Biodegradation and Bioconcentration. Tokyo, Japan: Natl Inst Tech Eval. Available at http://www.safe.nite.go.jp/englich/db.html as of July 3, 2008. (6) Hirsch P, Alexander M; Canadian J Microbiol 6: 241-49 (1990)] \*\*PEER REVIEWED\*\*” | | | |
| **2.3 Soil/Water/Sed. half-life (abiotic)**  Low: <60 days  Medium: 60 – 180 days  High: >180 days |  | | | |
| **2.4 Solubility in Water**  Negligible: <1e-3 mg/L  Low: 1E-3 to 1 mg/L  Medium: 1 to 1000 mg/L  High: >1000 mg/L | miscible |  | HSDB |  |
| **2.5 Henry’s Law const.**  Nonvolatile (<3 E-7 atm m3/mol)  Low (3E-7 to 1E-5 atm m3/mol)  Mod. (1E-5 to 1E-3 atm m3/mol)  High (>1E-3 atm m3/mol) | 8.38e-9 | atm m3/mol | HSDB | **Volatility class: NONVOLATILE** |
| **2.6 WWTP removal**  Low concern: >90%  Medium concern: 10 to 90%  High concern: <10% |  | | | |
| **Molecular weight** | 128.94 | g/mol |  |  |
| **2.7 Vapor Pressure**  Negligible: below 1E-08 mm Hg  Low: 1E-8 to 1E-4 mm Hg  Moderate: 1E-4 to 1 mm Hg  High: >1 mm Hg | 0.179 | mm Hg | HSDB |  |
| **Kow** | 0.92 | log | HSDB | Can estimate log Koc from log Kow using equation in Apdx B of EPA RSEI document: <http://www.epa.gov/opptintr/rsei/pubs/tech_app_b.pdf>  Equation on page B-4 (originally from Lyman et al 1990, Handbook of Chemical Estimation Properties):  **log (Koc) = 0.544 × log (Kow) + 1.377**   |  |  | | --- | --- | | **Enter log Kow below** | **Highlight # below and press F9 to calculate log Koc** | | **0.92** | **1.877** | |
| **2.8 BCF**  Not bioaccum: <1000  Moderate: 1000-5000  High: >5000 | Avg modeled value 1.92 (EPA Chem Dashboard) | | | |
| **Breakdown Products** |  | | | |
| **Key messages for Information Sheet** | **Persistence and Mobility in the Environment**  In soil, dichloroacetic acid is expected to be highly mobile. In lakes and rivers, it biodegrades over a period of days to weeks. [sources: HSDB, EPA Chemistry dashboard] | | | |
| **Potential Issues/Concerns or Unresolved Questions** |  | | | |
| **Secondary Reviewer questions/observations** |  | | | |

**3. Chemical Emissions and Disposal.**

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| **3.1 Wastewater Conc.**  Low: <1 ug/L (effluent)  Medium: 1 to 10 ug/L (effluent)  High: >10 ug/L (effluent)  no data  **3a. WW detection frequency (MN)**  Zero: no known detections  Low: 0%<freq< 20%  High: ≥20%  no data  **3b. WW detection freq. (non MN)**  Zero: no detections  Low: 0%<freq< 25%  High: ≥25%  no data | **[USGS db codes WI (untreated) and WE (treated)]** |
| **Landfill Leachate: [USGS db code LFLCH]** |
| **Feedlot Lagoons: [USGS db code FLLAG]** |
| **3.2 Down-the-Drain Disposal**  Low: <10,000 lbs/yr  Medium: 10,000-1M lbs/yr  High: >1M lbs/yr |  |
| **3.3 Landfill disposal**  Low: <10,000 lbs/yr  Medium: 10,000-1M lbs/yr  High: >1M lbs/yr |  |
| **3.4 Pesticide/fertilizer Releases to Land**  Low: <1,000 lbs/yr  Medium: 1,000-10,000 lbs/yr  High: >10,000 lbs/yr | Use mean [MDA sales data](http://www.mda.state.mn.us/en/chemicals/pesticides/useandsales.aspx) from most recent three years, if available.  Is there a trend up or down in recent years? Most recent year (2013) was 90% lower than preceding year. Not certain if there’s a trend or if it is a single anomalous year. |
| **3.5 Pesticide/fertilizer Releases to Water**  Low: <1,000 lbs/yr  Medium: 1,000-10,000 lbs/yr  High: >10,000 lbs/yr | Use mean [MDA sales data](http://www.mda.state.mn.us/en/chemicals/pesticides/useandsales.aspx) from most recent three years, if available.  Is there a trend up or down in recent years? |
| **3.6 Industrial Releases to Water**  **(Mfg., Processing, or Use)**  Low: <100 lbs/yr PER SITE  Medium: 100-1000 lbs/yr PER SITE  High: >1000 lbs/yr PER SITE |  |
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**4. Chemical Occurrence in Environment, Drinking Water, and Food.**

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| **4.0. Key Data Sources.**  **WW=wastewater; DW=drinking water; SW=surface water; GW=groundwater.**  **Check any boxes that apply, then provide details in Sections 3.1, 4.1, 4.2, 4.3, and 4.4.** | **Checked?** | **3.1**  WW | **4.1** Finished DW | | **4.2** Source DW | | **4.3**  Non Source SW | **4.4**  Non Source GW |
| **Meta-databases** |  |  | **SW** | **GW** | **SW** | **GW** |  |  |
| USGS database |  |  |  |  |  |  |  |  |
| [Water Quality Portal](http://waterqualitydata.us/portal/) |  |  |  |  |  |  |  |  |
| [Water Quality Portal](http://waterqualitydata.us/portal/) (OUTSIDE MINNESOTA) |  |  |  |  |  |  |  |  |
| **Individual data sources** |  |  |  |  |  |  |  |  |
| [UCMR 4](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\EPA\UCMR%201-4\UCMR%204) |  |  |  |  |  |  |  |  |
| [UCMR 4](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\EPA\UCMR%201-4\UCMR%204) (OUTSIDE MN) |  |  |  |  |  |  |  |  |
| [UCMR 3](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\EPA\UCMR%201-4\UCMR%203) |  |  |  |  |  |  |  |  |
| [UCMR 3](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\EPA\UCMR%201-4\UCMR%203) (OUTSIDE MN) |  |  |  |  |  |  |  |  |
| [UCMR 2](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\EPA\UCMR%201-4\UCMR%202) |  |  |  |  |  |  |  |  |
| [UCMR 2](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\EPA\UCMR%201-4\UCMR%202) (OUTSIDE MN) |  |  |  |  |  |  |  |  |
| [UCMR 1](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\EPA\UCMR%201-4\UCMR%201) |  |  |  |  |  |  |  |  |
| [UCMR 1](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\EPA\UCMR%201-4\UCMR%201) (OUTSIDE MN) |  |  |  |  |  |  |  |  |
| [MDA 2016 WQ Monitoring Report](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MDA\2016wqmrpt.pdf) |  |  |  |  |  |  |  |  |
| [MDA 2015 WQ Monitoring Report](file:///\\Data3fb\eh\HRA\COMMON\DWCEC\Relevant%20data\MDA\2015wqmreport.pdf) |  |  |  |  |  |  |  |  |
| [MDA 2014 WQ Monitoring Report](file:///\\Data3fb\eh\HRA\COMMON\DWCEC\Relevant%20data\MDA\wqm2014rpt.pdf) |  |  |  |  |  |  |  |  |
| [MDA 2013 WQ Monitoring Report](file:///\\Data3fb\eh\HRA\COMMON\DWCEC\Relevant%20data\MDA\2013wqmreport.pdf) |  |  |  |  |  |  |  |  |
| [MDA 2012 WQ Monitoring Report](file:///\\Data3fb\eh\HRA\COMMON\DWCEC\Relevant%20data\MDA\2012wqmreport.pdf) |  |  |  |  |  |  |  |  |
| [MPCA 2017 Pharms and Chems of Concern in Rivers](file:///\\Data3fb\eh\HRA\COMMON\DWCEC\Relevant%20data\MPCA\MPCA-pharms-EACs%20in%20lakes%20rivers\MPCA2017_Pharm&CECsInRivers_Occur&BiologEffects_FinalReport_Jan2017.pdf) |  |  |  |  |  |  |  |  |
| [MPCA 2015 Pharms PCPs and EAC Monitoring Lakes and Rivers 2013](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\MPCA-pharms-EACs%20in%20lakes%20rivers\MPCA2015_PharmPerCareProd&EDCs_MonitoringInLakes&Rivers_2013_tdr-g1-18.pdf) |  |  |  |  |  |  |  |  |
| [MPCA 2013 Pharms PCPs Rivers and Streams 2010](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\MPCA-pharms-EACs%20in%20lakes%20rivers\MPCA%202013%20pharms%20PPCPs%20rivers%20streams2010_%20tdr-g1-17.pdf) |  |  |  |  |  |  |  |  |
| [MPCA 2013 Pharms and EACs in Lakes](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\MPCA-pharms-EACs%20in%20lakes%20rivers\MPCA%202013%20pharms%20EACs%20Lakes%20tdr-g1-16.pdf) |  |  |  |  |  |  |  |  |
| [MPCA 2013 Condition of MN Groundwater 2007-2011](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\AmbGroundWater-kroening\MPCA_ConditOfMN%20GW_2007-2011_Aug2013.pdf) |  |  |  |  |  |  |  |  |
| [MPCA 2012 EACs and CECs in MN Groundwater 2009-2010](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\MPCA%20EAC%20and%20other%20CECs%20in%20Gwtr%202009-2010.pdf) |  |  |  |  |  |  |  |  |
| [MPCA 2011 WWTP EDC Mon Study](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\Wastewater%20Treatment%20Plant%20Endocrine%20Disrupting%20Chemical%20Monitoring%20Study_Feb2011.pdf) |  |  |  |  |  |  |  |  |
| [MPCA 2010 WWTP EDC Mon Study](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\MPCA%20WWT%20EDC%202010.pdf) (link to [data](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\MPCA%20WWT%20EDC%202010_DataReport.pdf)) |  |  |  |  |  |  |  |  |
| [MPCA 2010 Statewide EDC Mon Study 2007-2008](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\MPCA%202010%20Statewide%20EDC%20Monitoring%202007-08.pdf) |  |  |  |  |  |  |  |  |
| [MPCA 2008 EDCs Report to Legislature](file:///\\Data3fb\eh\HRA\COMMON\DWCEC\Relevant%20data\MPCA\MPCA%202008%20EDC%20Report%20to%20Leg.pdf) |  |  |  |  |  |  |  |  |
| [National Park Service 2013-- No report, just data](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\NationalParkService) |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| [USGS SIR2014-5154 Overview Pesticides Streams Rivers USA 1992-2011](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\USGS\USGS%20Report2014_5154) |  |  |  |  |  |  |  |  |
| [USGS SIR2014-5139 Organics in Source Water USA 2002-2010](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\USGS\USGS%20ScienInvestReport2014_5139) |  |  |  |  |  |  |  |  |
| [USGS SIR2014-5135 Pesticide Trends US Rivers 1992-2010](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\USGS\USGS%202014-5135) |  |  |  |  |  |  |  |  |
| [USGS SIR2011-5229 WQ Asmt Aquifers Northern Midwest](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\USGS\USGS%20Report2011_5229) |  |  |  |  |  |  |  |  |
| [USGS DS878 Pharms shallow GW Minnesota](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\MPCA\AmbGroundWater-kroening\DS878%20pharms%20in%20MN%20GW\ds878%20Pharms%20in%20MN%20groundwater%202013.pdf) |  |  |  |  |  |  |  |  |
| [MNDWIS](file:///C:\Users\greenc1\Desktop\MNDWIS.lnk)\* |  |  |  |  |  |  |  |  |
| [EPA/USGS DWTP study 2017](file:///\\Data3fb\eh\HRA\COMMON\DWCEC\Relevant%20data\EPA\EPA_USGS%20DWTP%20study) |  |  |  |  |  |  |  |  |
| Also check for data submitted with the nomination. See link provided in the [nominations tracking table](file:///O:\HRA\COMMON\DWCEC\Candidate%20Screening%20and%20Ranking\Nominations\_Nominations%20Tracking.xlsx) (link is under “Date of Nomination.”) |  |  |  |  |  |  |  |  |

\* *As of May 2017, MNDWIS will truncate Excel outputs to 16,384 rows. If your data set is longer, you will need to split it up by date into sections that are each less than 16,383 records (plus one row for the headers.)*

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| **4.1 Finished Drinking Water**  Low: <0.01 ug/L  Medium: 0.01 – 1 ug/L  High: >1 ug/L  no data  **4a. DW detection frequency (MN)**  Not present: 0%  Low: 0%<freq<5%  High: ≥5%  no data  **4b. DW detection freq. (non MN)**  Not present: 0%  Low: 0%<freq<10%  High: ≥10%  no data | **Minnesota**    Note: “Will react with water or steam to produce toxic and corrosive fumes. When heated to decomposition it emits toxic fumes[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 10th ed. Volumes 1-3 New York, NY: John Wiley & Sons Inc., 1999., p. 1176] \*\*PEER REVIEWED\*\*  [Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 10th ed. Volumes 1-3 New York, NY: John Wiley & Sons Inc., 1999., p. 1176] \*\*PEER REVIEWED\*\*”  Potential concern when water is boiled or used in industrial settings (steam heating, etc.)?? | |
| **Outside Minnesota**  From HSDB: DRINKING WATER: Water sampled from 6 full-scale treatment drinking water plants from 1983 to 1984 contained dichloroacetic acid at concns ranging from 8 to 79 ug/L(1). During a survey of drinking waters at water treatment plants treating lowland river water in England, dichloroacetic acid was detected at unreported concns(2). Water samples collected from 35 drinking water treatment facilities during 1988 contained dichloroacetic acid at concns ranging from 5.0 to 7.3 ug/L(3). Tap water from Japan contained dichloroacetic acid at concns of 2.8 to 10.9 ug/L during 1987 to 1988(4). 20 Drinking water samples collected in The Netherlands contained dichloroacetic acid ranging from <0.1 ug/L (below detection) to 3.0 ug/L; dichloroacetic acid was found only in drinking water prepared from surface waters and not from water prepared from groundwater sources(5). Tap water collected near 2 Massachusetts water treatment plants immediately following treatment contained dichloroacetic acid at concns ranging from 63.1 to 133 ug/L(6).[(1) Singer PC, Chang SD; J Amer Water Works Assoc 81: 61-5 (1989) (2) Fielding M et al; Organic Micropollutants in Drinking Water. TR-159. Medmanham, Eng. Water Res Cent (1981) (3) Krasner SW et al; J Amer Water Works Assoc 81: 41-53 (1989) (4) Ohura T et al; Eisei Kenkyo 11: 153-5 (1987) (5) Peters RJB et al; Wat Res 25: 473-77 (1991) (6) Uden PC, Miller JW; J Amer Water Works Assoc 75: 524-7 (1983)] \*\*PEER REVIEWED\*\*  [(1) Singer PC, Chang SD; J Amer Water Works Assoc 81: 61-5 (1989) (2) Fielding M et al; Organic Micropollutants in Drinking Water. TR-159. Medmanham, Eng. Water Res Cent (1981) (3) Krasner SW et al; J Amer Water Works Assoc 81: 41-53 (1989) (4) Ohura T et al; Eisei Kenkyo 11: 153-5 (1987) (5) Peters RJB et al; Wat Res 25: 473-77 (1991) (6) Uden PC, Miller JW; J Amer Water Works Assoc 75: 524-7 (1983)] \*\*PEER REVIEWED\*\*  DRINKING WATER: Dichloroacetic acid was measured as a disinfection by-product at two water treatment plants(1). After chlorine treatment, concentrations of dichloroacetic acid ranged from 9.4 to 23 ug/L; after both ozone and chlorine treatment, concentrations of dichloroacetic acid ranged from 4.7 to 21 ug/L(1). Drinking water samples collected from Cincinnati, OH (in 1978 and 1980), Miami, FL (in 1976), Philadelphia, PA (in 1976), Ottumwa, IA (in 1976), and Seattle, WA (in 1976) contained dichloroacetic acid at unreported concentrations(2). Dibromochloroacetic acid levels in finished drinking water samples from the Philadelphia, PA Suburban Water Co., Houston, TX, Metropolitan Water District of Southern California and Corpus Christi, TX were 2.15, 12.7, 7.02 and 5.45 ug/L, respectively(3).[(1) Jacangelo JG et al; J Amer Wat Works Assoc 81: 74-84 (1989) (2) Lucas SV; GC/MS Analysis of Organics in Drinking Water Concentrates and Advanced Waste Treatment Concentrates: Vol 1. Analysis Results for 17 Drinking Water, 16 Advanced Waste Treatment and 3 Process Blank Concentrates. USEPA-600/1-84-020A (NTIS PB85-128221). Columbus, OH: Columbus Labs. Health Eff Res Lab (1984) (3) Cowman GA, Singer PC; Environ Sci Technol 30: 16-24 (1996)] \*\*PEER REVIEWED\*\*  [(1) Jacangelo JG et al; J Amer Wat Works Assoc 81: 74-84 (1989) (2) Lucas SV; GC/MS Analysis of Organics in Drinking Water Concentrates and Advanced Waste Treatment Concentrates: Vol 1. Analysis Results for 17 Drinking Water, 16 Advanced Waste Treatment and 3 Process Blank Concentrates. USEPA-600/1-84-020A (NTIS PB85-128221). Columbus, OH: Columbus Labs. Health Eff Res Lab (1984) (3) Cowman GA, Singer PC; Environ Sci Technol 30: 16-24 (1996)] \*\*PEER REVIEWED\*\*  DRINKING WATER: Water collected from fifty-three Canadian drinking water treatment facilities in winter of 1993 contained dichloroacetic acid(1). When bromide concentrations were very low (<0.01 mg/L), the water contained 20.6 ug/L dichloroacetic acid; when bromide was low (0.06 mg/L), the water contained 3.8 ug/L dichloroacetic acid; when bromide was moderate (0.5 mg/L), the water contained 0.3 ug/L dichloroacetic acid(1). A mean concentration of 1.07 ug/L dichloroacetic acid was measured in post-treatment surface water from disinfection utilities in Belgium, France, Germany, Spain, The Netherlands, and Italy; post-treatment groundwater from disinfection utilities contained a mean 0.83 ug/L dichloroacetic acid(2).[(1) Williams DT et al; Chemosphere 34: 299-316 (1997) (2) Palacios M et al; Wat Res 34: 1002-1016 (2000)] \*\*PEER REVIEWED\*\*  [(1) Williams DT et al; Chemosphere 34: 299-316 (1997) (2) Palacios M et al; Wat Res 34: 1002-1016 (2000)] \*\*PEER REVIEWED\*\*  DRINKING WATER: Swiss drinking water monitored between 1996 and 1997 contained <6-217 ng/L dichloroacetic acid(1). Dichloroacetic acid was measured in water samples taken from Barcelona's water treatment plant between November 1997 and March 1998; the compound was detected in prechlorinated water (2.8-16 ug/L), sand-filtered water (2.8-14 ug/L), ozonated water (3.4-10 ug/L), granulated activated carbon-filtered water (not detected-2.7 ug/L), and postchlorinated water (not detected-2.0 ug/L)(2). Dichloroacetic acid was detected at 31 of 35 Finnish waterworks between January and October 1994 with concentrations between 3 and 42 ug/L; levels at all other facilities were below quantitation limits(3).[(1) Berg M et al; Environ Sci Technol 34: 2675-2683 (2000) (2) Cancho B et al; Bull Environ Contam Toxicol 63: 610-617 (1999) (3) Nissinen et al; Chemosphere 48: 9-20 (2002)] \*\*PEER REVIEWED\*\*  [(1) Berg M et al; Environ Sci Technol 34: 2675-2683 (2000) (2) Cancho B et al; Bull Environ Contam Toxicol 63: 610-617 (1999) (3) Nissinen et al; Chemosphere 48: 9-20 (2002)] \*\*PEER REVIEWED\*\*  DRINKING WATER: Dibromochloroacetic acid levels in finished drinking water samples from the Philadelphia, PA Suburban Water Co., Houston, TX, Metropolitan Water District of Southern California and Corpus Christi, TX were 2.15, 12.7, 7.02 and 5.45 ug/L, respectively(1).[(1) Cowman GA, Singer PC; Environ Sci Technol 30: 16-24 (1996)] \*\*PEER REVIEWED\*\*  [(1) Cowman GA, Singer PC; Environ Sci Technol 30: 16-24 (1996)] \*\*PEER REVIEWED\*\*  WQ portal has some drinking water monitoring data from NJ, Utah, California.  NJ: 79 records, 72 detects, mean 5.8 ug/L, max 36 ug/L  CA: 1066 samples, 911 detects, mean 93.7, max 790. Appears to be groundwater?  UT: 13 records, 7 detects. Mean 10.1, max 15.5 | |
| **4.2 Pretreatment Source Water**  **(Groundwater or Surface)**  Low: <0.01 ug/L  Medium: 0.01 – 1 ug/L  High: >1 ug/L  no data  **4c. PTSW detection frequency (MN)**  Not present: 0%  Low: 0%<freq<5%  High: ≥5%  no data  **4d. PTSW detection freq. (non MN)**  Not present: 0%  Low: 0%<freq<10%  High: ≥10%  no data | **Minnesota [USGS db codes DWR-SW (source water-surface) and DWR-GW (source water-ground)]** | |
| **Outside Minnesota** | |
| **4.3 Non-Source Surface Water**  Low: <0.01 ug/L  Medium: 0.01 – 10 ug/L  High: >10 ug/L  **4e. SW detection frequency (MN)**  Not present: 0%  Low: 0%<freq<10%  High: ≥10%  no data  **4f. SW detection freq. (non MN)**  Not present: 0%  Low: 0%<freq<15%  High: ≥15%  no data | **Minnesota USGS db codes:**   |  |  | | --- | --- | | **LK** | **Sample collected from a lake** | | **LKDW** | **Sample collected from a lake with a nearby wastewater effluent discharge** | | **ST** | **Sample collected from a stream** | | **STRDW** | **Sample collected from a stream intentionally located downstream of wastewater effluent discharge** | | |
| **Outside Minnesota** | |
| **4.4 Non-Source Groundwater**  Low: <0.01 ug/L  Medium: 0.01 – 10 ug/L  High: >10 ug/L  **4g. NSGW detection frequency (MN)**  Not present: 0%  Low: 0%<freq<5%  High: ≥5%  no data  **4h. NSGW detection frequency**  **(non MN)**  Not present: 0%  Low: 0%<freq<5%  High: ≥5%  no data | **Minnesota USGS db codes:**   |  |  | | --- | --- | | **GW** | **Sample collected from groundwater** | | **GWCS** | **Sample collected from groundwater underlying an urban residential area served by a central sewer system** | | **GWFL** | **Sample collected from groundwater underlying feedlot** | | **GWIC** | **Sample collected from groundwater underlying urban/industrial/commercial land use** | | **GWISTS** | **Sample collected from groundwater in individual septic system drain field** | | **GWLF** | **Sample collected from groundwater underlying landfill or dump** | | **GWSR** | **Sample collected from groundwater underlying an urban residential area served by individual septic systems** | | **GWUN** | **Sample collected from groundwater underlying an undeveloped area such as a forest or park within an urban area** | | |
| **Outside Minnesota** | |
| **4i. USGS Tier (WATER)**  Tier 1  Tier 2  Tier 3  Not Rated  Not on List | Is the chemical a USGS Tier 1, 2, or 3 chemical for water? ([link to database](file:///O:\HRA\COMMON\DWCEC\Relevant%20data\USGS\USGS%20Report%202012-5218\Copy%20of%20NTASdatabase-1.xlsx))  (This is used for screening/ranking.)  Tier 1 for water | |
| **4j. USGS Tier (SEDIMENT)**  Tier 1  Tier 2  Tier 3  Not Rated  Not on List | Is the chemical a USGS Tier 1, 2, or 3 chemical for sediment? ([link to database](file:///O:\\HRA\\COMMON\\DWCEC\\Relevant%20data\\USGS\\USGS%20Report%202012-5218\\Copy%20of%20NTASdatabase-1.xlsx))  (This is used for screening/ranking.)  No rating for sediment. | |
| **Minnesota Groundwater** | **Looked for? No** | **This is included for HRL Rule requirements. Groundwater studies are described above, under source water or non-source groundwater.** |
| **Detected? No** |
| **Air and Dust** |  | |
| **Food** |  | |
| **Soil/Sediment** |  | |
| **Sludge/Biosolids** |  | |
| **Key messages for Information Sheet** | **Environmental Detections in Minnesota**  Dicloroacetic acid has been analyzed in thousands of Minnesota drinking water samples since 1998, and was detected in 77 percent of samples. The average detection was 9.8 ug/L, and the maximum was 120 ug/L. The most recent detection was in 2018. [source: MNDWIS] This chemical is included on EPA’s list of UCMR4 contaminants, so more data from water systems around the state will be available starting in 2018.    **Environmental Releases**  In areas where domestic drinking water contains dichloroacetic acid as a result of disinfection, dichloroacetic acid may potentially be released to surface water from wastewater treatment plants.    **Exposure Routes**  Among the general population, the principal source of exposure to dichloroacetic acid is through drinking water. People who work in industries that use dichloroacetic acid may be exposed at work. | |
| **Potential Issues/Concerns or Unresolved Questions** |  | |
| **Secondary Reviewer questions/observations** |  | |

**5. Human Exposure.** For each item, briefly summarize available data. For spaces in the table left blank, explain where you looked and indicate that no data were found.

(Sources: [NHANES](http://www.cdc.gov/nchs/nhanes.htm); [PubMed (NIH/NLM)](http://www.ncbi.nlm.nih.gov/pubmed/); [**TOXNET**](http://toxnet.nlm.nih.gov/index.html)**;** [ATSDR](http://www.atsdr.cdc.gov/); [EPA HPV Challenge Program](http://www.epa.gov/hpv/pubs/summaries/viewsrch.htm))

|  |  |
| --- | --- |
| **Exposure Screening** | **Screening Assessment of *Exposure Potential***  **5a:** **Presence in consumer products**  Known: Reliable data indicating intentional use in consumer products (taken internally, applied to body, or present in the home environment). Some possible sources: [HSDB](http://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm), IUR, [NLM household products database](http://householdproducts.nlm.nih.gov/index.htm), or other (by design or as a contaminant)  Possible: Less conclusive information on presence in consumer products at home.  Unlikely: Looked for in consumer products, but not found. ***Skip to step 5c.***  No information found. ***Skip to step 5c.***  **5b: Individual direct exposure potential – Consumer products**  Known: Reliable data indicating that exposure occurs; deliberate intake via ingestion, inhalation or dermal contact > 1 hr.  Possible: VP>1 mm Hg; Solubility > 1000 mg/L; dermal contact 3 min to 1 hour  Unlikely: VP<1 mm Hg; water solubility<1000 mg/L; skin contact <3 min  **5c: Present in food or drinking water**  Known: Reliable data indicating deliberate use in food, food contact applications, or drinking water. Sources: FDA [EAFUS database](http://www.accessdata.fda.gov/scripts/fcn/fcnnavigation.cfm?rpt=eafuslisting); also see [FDA Food Additive Status List](https://www.fda.gov/Food/IngredientsPackagingLabeling/FoodAdditivesIngredients/ucm091048.htm#ftnB)  Possible: data from HSDB, IUR, NLM household products database, or other sources indicating presence in food or drinking water (by design or as a contaminant)  Unlikely: Looked for in food/drinking water, but not found.  No information found.  **5d: Individual exposure potential – Food/Drinking Water**  If presence in food/DW (5c) is known or possible, consumption is assumed.  If presence in food/DW (5c) is unlikely or “no information,” consumption is not assumed.  **Screening Assessment of *Measured Human Exposures***  **5e: General population (non-occupational) exposure measurements**  1. Detected in [NHANES](https://www.cdc.gov/exposurereport/) or other biomonitoring studies? [PubMed (NIH/NLM)](http://www.ncbi.nlm.nih.gov/pubmed/) see HSDB ref below  2. Biomonitoring California: [Designated Chemical](http://www.biomonitoring.ca.gov/chemicals/designated-chemicals)  3. Biomonitoring California: [Priority Chemical](http://www.biomonitoring.ca.gov/chemicals/priority-chemicals)  4. Biomonitoring California: [“Chemicals Monitored” list](http://www.biomonitoring.ca.gov/chemicals/chemicals-biomonitored-california)  5. CDC: [National Biomonitoring Study](http://www.cdc.gov/biomonitoring/biomonitoring_summaries.html)  6. Included in EPA VCCEP candidate list, [Table 3](http://www.epa.gov/oppt/vccep/pubs/vccepmth.html) (children’s exposure; includes NHANES and other sources)  (also check VCCEP Table 2, which indicates chemicals ***not*** detected in biomonitoring.) Note that the page is quite old.)  7. EPA Design for the Environment: [“Safer Ingredients”](https://www.epa.gov/saferchoice/safer-ingredients) list |
|  |  |
|  |  |
| **Exposure Assessment** | (not a priority during screening, but add any info if found during screening.) |
| **Tested in the human body? (blood, urine, etc.)** | From HSDB: “Dichoroacetic acid was detected in the urine of humans who consumed disinfected drinking water; there was no significant correlation between ingestion exposure and excretion rate in urine samples(1).[(1) Kim H et al; Environ Res A80: 187-195 (1999)] \*\*PEER REVIEWED\*\*  [(1) Kim H et al; Environ Res A80: 187-195 (1999)] \*\*PEER REVIEWED\*\* |
| **Has exposure been measured or estimated?**  **Dermal**  **Inhalation**  **Drinking Water**  **Food**  **Incidental Ingestion** | From HSDB: “NIOSH (NOES Survey 1981-1983) has statistically estimated that 1,592 workers (579 of these were female) were potentially exposed to dichloroacetic acid in the US(1). Occupational exposure to dichloroacetic acid may occur through inhalation and dermal contact with this compound at workplaces where it is produced or used. Monitoring data indicate that the general population may be exposed to dichloroacetic acid via ingestion of chlorinated or chloraminated drinking water(SRC).[(1) NIOSH; NOES. National Occupational Exposure Survey conducted from 1981-1983. Estimated numbers of employees potentially exposed to specific agents by 2-digit standard industrial classification (SIC). Available at http://www.cdc.gov/noes/ as of July 3, 2008.] \*\*PEER REVIEWED\*\*  [(1) NIOSH; NOES. National Occupational Exposure Survey conducted from 1981-1983. Estimated numbers of employees potentially exposed to specific agents by 2-digit standard industrial classification (SIC). Available at http://www.cdc.gov/noes/ as of July 3, 2008.] \*\*PEER REVIEWED\*\* \*\*”  From EPA Chem Dashboard: |
| **Have average daily doses been estimated?** |  |
| **Relative Source Contribution** | (based on available estimates of exposure, is the “standard” RSC of 0.2 & 0.5 a reasonable assumption?)  (This section is completed during full review, not during screening.) |
| **Are there any populations (children, elderly, etc.) who are a special concern for this chemical?** |  |
|  |  |
| **Key messages for Information Sheet** | **Drinking Water Concerns**  Dichloroacetic acid has the potential to be present in drinking water that has been disinfected with chlorine. Dichloroacetic acid has been detected in 77 percent of Minnesota drinking water samples tested since 1998. EPA is currently (2018) beginning a two-year sampling program to test for dichloroacetic acid and related chemicals in many municipal drinking water systems across the state.  **Risk Potential from Known Exposures**  **How to Reduce Exposure** |
| **Secondary Reviewer questions/observations** | (note any disagreements/additions/corrections) |

**6. Review History and Contacts**

|  |  |
| --- | --- |
| **Screening Reviewer, Date** | CEC screening, Chris Greene, Jan 2018 |
| **Primary Reviewer, Date** |  |
| **Secondary Reviewer, Date** |  |
| **MDH staff with an interest in this chemical** | (for example: staff from infectious disease, staff who deal with pesticide application issues, staff who may be involved with public messages about this chemical. Not necessarily people we are asking for information) |
| **MDH and other state agency staff with information on this chemical** | (list individuals who may have information to contribute) |
| **Other state agencies to be contacted** | (list state agencies that may need to be kept informed of this review. For example, MPCA, MDA) |
| **Potential MDH actions for this chemical** | For example: recommend addition to CCL4 list; send comments to EPA; advise MPCA on potential exposure; recommend sampling by MDH; offer advice to public on how to reduce impacts or personal exposure; etc.) |
| **Record of contacts** | (keep a list of correspondence, items that need follow-up, questions asked, etc.) |

[PubMed (NIH/NLM)](http://www.ncbi.nlm.nih.gov/pubmed/)

**References**