United States
Environmental Protection Agency

Office of Chemical Safety and
Pollution Prevention

Proposed Designation of 1,1-Dichloroethane (CASRN 75-34-3) as a High-Priority Substance for Risk Evaluation

August 22, 2019

Table of Contents

List of Tables

Acronyms and Abbreviations

Term	Description
ACGIH	American Conference of Governmental Industrial Hygienists
ATSDR	Agency for Toxic Substances and Disease Registry
Biomon.	Biomonitoring
BOD	Biochemical oxygen demand
BP	Boiling point
CAA	Clean Air Act
CASRN	Chemical Abstracts Service Registry Number
CBI	Confidential Business Information
CDR	Chemical Data Reporting
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Concen.	Concentration
CWA	Clean Water Act
CPDat	Chemical and Products Database
ECOTOX	Ecotoxicology Database
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FDA	U.S. Food and Drug Administration
FR	Federal Register
GC	Gas chromatography
HPLC	High performance liquid chromatography
IRIS	Integrated Risk Information System
IUR	Inventory Update Rule
K	Thousand
K_{OC}	Organic carbon-water partition coefficient
K_{OW}	Octanol-water partition coefficient
M	Million

Term	Description
MITI	Ministry of International Trade and Industry
MP	Melting point
NAICS	North American Industry Classification System
NIH	National Institute of Health
NIOSH	National Institute for Occupational Safety and Health
NR	Not reported
OECD	Organisation for Economic Co-operation and Development
·OH	Hydroxyl radical
OPPT	Office of Pollution Prevention and Toxics
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
POTW	Publicly owned treatment works
PPE	Personal protective equipment
PPM	Parts per million
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit
RY	Reporting Year
SOP	Standard Operating Procedure
SMILES	Simplified Molecular-Input Line-Entry System
$T_{1/2}$	Half-life
TG	Test guidance
TLV	Threshold Limit Value
TRI	Toxics Release Inventory
TSCA	Toxic Substances Control Act
TWA	Time weighted average
USGS	United States Geological Survey
VP	Vapor pressure
WS	Water solubility

1. Introduction

In section 6(b)(1)(B) of the Toxic Substances Control Act (TSCA), as amended, and in the U.S. Environmental Protection Agency's implementing regulations (40 CFR 702.3)[1], a high-priority substance for risk evaluation is defined as a chemical substance that EPA determines, without consideration of costs or other non-risk factors, may present an unreasonable risk of injury to health or the environment because of a potential hazard and a potential route of exposure under the conditions of use, including an unreasonable risk to potentially exposed or susceptible subpopulations identified as relevant by EPA.

Before designating prioritization status, under EPA's regulations at 40 CFR 702.9 and pursuant to TSCA section 6(b)(1)(A), EPA will generally use reasonably available information to screen the candidate chemical substance under its conditions of use against the following criteria and considerations:

- the hazard and exposure potential of the chemical substance;
- persistence and bioaccumulation;
- potentially exposed or susceptible subpopulations;
- storage near significant sources of drinking water;
- conditions of use or significant changes in the conditions of use of the chemical substance;
- the chemical substance's production volume or significant changes in production volume; and
- other risk-based criteria that EPA determines to be relevant to the designation of the chemical substance's priority.

This document presents the review of the candidate chemical substance against the criteria and considerations set forth in 40 CFR 702.9 for a may present risk finding. The information sources used are relevant to the criteria and considerations and consistent with the scientific standards of TSCA section 26(h), including, as appropriate, sources for hazard and exposure data listed in Appendices A and B of the *TSCA Work Plan Chemicals: Methods Document* (February 2012) (40 CFR 702.9(b)). EPA uses scientific information that is consistent with the best available science. Final designation of the chemical substance as a high-priority chemical substance would immediately initiate the risk evaluation process as described in the EPA's final rule, *Procedures for Chemical Risk Evaluation Under the Amended Toxic Substances Control Act* (40 CFR 702).

1,1-Dichloroethane is one of the 40 chemical substances initiated for prioritization as referenced in the March 21, 2019 notice (84 FR 10491)[2]. EPA has determined that 1,1-dichloroethane is a suitable candidate for the proposed designation as a high-priority chemical substance. The proposed designation is based on the results of the review against the aforementioned criteria and considerations as well as review of the reasonably available information on 1,1-dichloroethane, including relevant information received from the public and other information as appropriate.

---

[1] NOTE: For all 40 CFR 702 citations, please refer to: https://www.govinfo.gov/content/pkg/CFR-2018-title40-vol33/xml/CFR-2018-title40-vol33-part702.xml and https://www.regulations.gov/document?D=EPA-HQ-OPPT-2016-0654-0108

[2] https://www.federalregister.gov/documents/2019/03/21/2019-05404/initiation-of-prioritization-under-the-toxic-substances-control-act-tsca

EPA will take comment on this proposed designation for 90 days before finalizing its designation of 1,1-dichloroethane. The docket number for providing comments on 1,1-dichloroethane is EPA-HQ-OPPT-2018-0426 and is available at www.regulations.gov.

The information, analysis, and basis for the review of the chemical is organized as follows:

- *Section 1 (Introduction)*: This section explains the requirements of the amended TSCA and implementing regulations – including the criteria and considerations -- pertinent to the prioritization and designation of high-priority chemical substances.

- *Section 2 (Production volume or significant changes in production volume*): This section presents information and analysis on national aggregate production volume of the chemical substance.

- *Section 3* (*Conditions of use or significant changes in conditions of use*): This section presents information and analysis regarding the chemical substance's conditions of use under TSCA.

- *Section 4* (*Potentially exposed or susceptible subpopulations*): This section presents information and analysis regarding potentially exposed or susceptible subpopulations, including children, women of reproductive age, and workers, with respect to the chemical substance.

- *Section 5* (*Persistence and bioaccumulation*): This section presents information and analysis regarding the physical and chemical properties of the chemical substance and the chemical's fate characteristics.

- *Section 6 (Storage near significant sources of drinking water*): This section presents information and analysis considered regarding the risk from the storage of the chemical substance near significant sources of drinking water.

- *Section 7* (*Hazard Potential*): This section presents the hazard information relevant to the chemical substance.

- *Section 8* (*Exposure Potential*): This section presents information and analysis regarding the exposures to the chemical substance.

- *Section 9 (Other risk-based criteria*): This section presents the extent to which EPA identified other risk-based criteria that are relevant to the designation of the chemical substance's priority.

- *Section 10 (Proposed designation*): Based on the results of the review performed and the information and analysis presented, this section describes the basis used by EPA to support the proposed designation.

2. Production volume or significant changes in production volume

Approach

EPA considered current volume or significant changes in volume of the chemical substance using information reported by manufacturers (including importers). EPA assembled reported information for years 1986 through 2015 on the production volume for 1,1-dichloroethane reported under the Inventory Update Reporting (IUR) rule and Chemical Data Reporting (CDR) rule.[3]

Results and Discussion

The national aggregate production volume, which is presented as a range to protect individual site production volumes that are confidential business information (CBI), is presented in Table 1.

Table 1. 1986–2015 National Aggregate Production Volume Data (Production Volume in Pounds)

Chemical ID	1986	1990	1994	1998	2002	2006	2011	2012	2013	2014	2015
1,1-Dichloroethane (75-34-3)	>100M to 500M	>100M to 500M	>500K to 1M	>1M to 10M	>500K to 1M	>100M to 500M	>1M to 10M	Withheld[4]	Withheld	Withheld	Withheld

Note: K = thousand, M = million

Reference: U.S. EPA (2013) and U.S. EPA (2017)

Production volume of 1,1-dichloroethane as reported to EPA decreased from 1986 to 2011. Production volume from 2012 to 2015 was withheld[5] (Table 1).

---

[3] Over time, the requirements for reporting frequency, production volume thresholds, and chemical substances under the Chemical Data Reporting (CDR) rule have changed. CDR was formerly known as the Inventory Update Rule (IUR). The first IUR collection occurred in 1986 and continued every four years through 2006. As part of two rulemakings in 2003 and 2005, EPA made a variety of changes to the IUR, including to change the reporting frequency to every five years to address burdens associated with new reporting requirements. Additional changes to reporting requirements were made in 2011, including to suspend and replace the 2011 submission period with a 2012 submission period, return to reporting every four years, and require the reporting of all years beginning with 2011 production volumes. The reporting of production volumes for all years was added because of the mounting evidence that many chemical substances, even larger production volume chemical substances, often experience wide fluctuations in production volume from year to year. In addition, also as part of the 2011 IUR Modifications final rule (76 FR 50816, Aug 16, 2011), EPA changed the name of the regulation from IUR to CDR to better reflect the distinction between this data collection (which includes exposure-related data) and the TSCA Inventory itself (which only involves chemical identification information).

[4] This information is withheld, because EPA is releasing the 2016 CDR data in stages. EPA released the initial 2016 CDR data in May 2017. The initial data included national production volume (released in ranges), other manufacturing information, and processing and use information, except for information claimed by the submitter to be confidential business information (CBI) or information that EPA is withholding to protect claims of CBI. EPA anticipates releasing additional data after completion of an effort to obtain CBI substantiation required by the Frank R. Lautenberg Chemical Safety for the 21st Century Act, which amended the Toxic Substances Control Act.

[5] This information is withheld, because EPA is releasing the 2016 CDR data in stages. EPA released the initial 2016 CDR data in May 2017. The initial data included national production volume (released in ranges), other manufacturing information, and processing and use information, except for information claimed by the submitter to be confidential business information (CBI) or information that EPA is withholding to protect claims of CBI. EPA anticipates releasing additional data after completion of an effort to obtain CBI substantiation required by the Frank R. Lautenberg Chemical Safety for the 21st Century Act, which amended the Toxic Substances Control Act.

3. Conditions of use or significant changes in conditions of use

Approach

EPA assembled information to determine conditions of use or significant changes in conditions of use of the chemical substance. TSCA section 3(4) defines the term “conditions of use” to mean the circumstances, as determined by the Administrator, under which a chemical substance is intended, known, or reasonably foreseen to be manufactured, processed, distributed in commerce, used, or disposed of.

A key source of reasonably available information that EPA considered for determining the conditions of use for 1,1-dichloroethane was submitted by manufacturers (including importers) under the 2012 and 2016 CDR reporting cycles. CDR requires manufacturers (including importers) to report information on the chemical substances they produce domestically or import into the United States greater than 25,000 lbs per site, except if certain TSCA actions apply (in which case the reporting requirement is greater than 2,500 lbs per site). CDR includes information on the manufacturing, processing, and use of chemical substances. Based on the known manufacturing, processing and uses of this chemical, EPA assumes distribution in commerce. CDR may not provide information on other life-cycle phases such as distribution or chemical end-of-life after use in products (i.e., disposal). While EPA may be aware of additional uses, CDR submitters are not required to provide information on chemical uses that are not regulated under TSCA.

For chemical substances under review that are included on the Toxics Release Inventory (TRI) chemical list, information disclosed by reporting facilities in Part II Section 3 (“Activities and Uses of the Toxic Chemical at the Facility”) of their TRI Form R reports was used to supplement the CDR information on conditions of use (Tables 4, 5 and 6). There is not a one-to-one correlation between conditions of use reported under CDR and information reported in Part II Section 3 of the TRI Form R because facilities are not required to disclose in their Form R submissions the specific uses of TRI chemical substances they manufactured on-site or imported. In addition to the information disclosed in Part II Section 3 of the TRI Form R, the information pertaining to waste management activities (i.e., disposal/releases, energy recovery, recycling, and treatment) disclosed in other sections of the Form R was also used to supplement the CDR information on conditions of use as shown in Tables 4, 5 and 6. For purposes of this proposed prioritization designation, EPA assumed end-of-life pathways that include releases to air, wastewater, and solid and liquid waste based on the conditions of use.

CDR and TRI Tables

Based on the publicly available[6] manufacturing information, industrial processing and use information, and consumer and commercial use information reported under CDR, EPA developed a list of conditions of use for the 2016 and 2012 reporting cycles (Table 2 and Table 3, respectively).

[6] Some specific chemical uses may be claimed by CDR submitters as confidential business information (CBI) under section 14 of TSCA. In these cases, EPA has indicated that the information is CBI.

Table 2. 1,1-Dichloroethane (CASRN 75-34-3) Categories and Subcategories of Conditions of Use [7](2016 CDR reporting cycle)

Life-Cycle Stage	Category	Subcategory of Use	Reference
Manufacturing	Domestic manufacturing	Domestic manufacturing	U.S. EPA (2019b)
Processing	As a reactant	Intermediate in: – All other basic organic chemical manufacturing – All other chemical product and preparation manufacturing	U.S. EPA (2019b)
Processing	Recycling	CBI[8]	U.S. EPA (2019b)
Distribution in commerce [a,b]	Distribution in commerce		
Disposal [a]	Disposal		
[a] CDR includes information on the manufacturing, processing, and use of chemical substances. CDR may not provide information on other life-cycle phases such as distribution or chemical end-of-life after use in products (i.e., disposal). The table row is highlighted in gray to indicate that no information is provided for this life-cycle stage. **[b] EPA is particularly interested in information from the public on distribution in commerce.**			

Table 3. 1,1-Dichloroethane (75-34-3) Categories and Subcategories of Conditions of Use[9] (2012 CDR reporting cycle)

Life-Cycle Stage	Category	Subcategory of Use	Reference
Manufacturing	Domestic manufacturing/Import	CBI[10]	U.S. EPA (2019b)
	Domestic manufacturing	Domestic manufacturing	U.S. EPA (2019b)
Processing	As a reactant	Intermediate in all other basic organic chemical manufacturing	U.S. EPA (2019b)
	Recycling	CBI	U.S. EPA (2019b)
Distribution in commerce [a,b]	Distribution in commerce		
Disposal [a]	Disposal		
[a] CDR includes information on the manufacturing, processing, and use of chemical substances. CDR may not provide information on other life-cycle phases such as distribution or chemical end-of-life after use in products (i.e., disposal). The table row is highlighted in gray to indicate that no information is provided for this life-cycle stage. **[b] EPA is particularly interested in information from the public on distribution in commerce.**			

[7] Certain other uses that are excluded from TSCA are not captured in this table.
[8] At this time, "CBI" indicates that a data element has been claimed CBI by the information submitter; it does not reflect the result of an EPA substantiation review.
[9] Certain other uses that are excluded from TSCA are not captured in this table.
[10] At this time, "CBI" indicates that a data element has been claimed CBI by the information submitter; it does not reflect the result of an EPA substantiation review.

EPA used TRI data to identify additional conditions of use and to supplement CDR information about conditions of use. In addition, TRI information from 2017 is useful for demonstrating that a condition of use reported to CDR in 2015 is still ongoing.

Table 4. Activities and Uses Reported to TRI for 1,1-Dichloroethane, Reporting Year 2011

Activity Type	Activity	Industry Group	NAICS Code
Manufacture	Produce	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Plastics Product Manufacturing	3261
	Import	Basic Chemical Manufacturing	3251
	Produce or import for on-site use/processing	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Produce or import for sale/distribution	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Plastics Product Manufacturing	3261
	Produce or import as a byproduct	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Plastics Product Manufacturing	3261
	Produce or import as an impurity	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
Process	Process as a reactant	Basic Chemical Manufacturing	3251
	Process as an impurity	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
Otherwise Use	Otherwise use – ancillary or other use	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252

Activity Type	Activity	Industry Group	NAICS Code
		Cement and Concrete Product Manufacturing	3273
		Waste Treatment and Disposal	5622
Waste Management	Disposal/releases	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Plastics Product Manufacturing	3261
		Cement and Concrete Product Manufacturing	3273
		Waste Treatment and Disposal	5622
	Energy recovery	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Cement and Concrete Product Manufacturing	3273
		Waste Treatment and Disposal	5622
	Recycling	Basic Chemical Manufacturing	3251
	Treatment	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Plastics Product Manufacturing	3261
		Waste Treatment and Disposal	5622

Reference: U.S. EPA, 2019d

Table 5. Activities and Uses Reported to TRI for 1,1-Dichloroethane, Reporting Year 2015

Activity Type	Activity	Industry Group	NAICS Code
Manufacture	Produce	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Import	Basic Chemical Manufacturing	3251
		Basic Chemical Manufacturing	3251

Activity Type	Activity	Industry Group	NAICS Code
	Produce or import for on-site use/processing	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Produce or import for sale/distribution	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Produce or import as a byproduct	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Produce or import as an impurity	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
Process	Process as a reactant	Basic Chemical Manufacturing	3251
	Process as an article component	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Process as an impurity	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
Otherwise Use	Otherwise use – ancillary or other use	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Cement and Concrete Product Manufacturing	3273
		Other Nonmetallic Mineral Product Manufacturing	3279
		Waste Treatment and Disposal	5622
Waste Management	Disposal/releases	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Cement and Concrete Product Manufacturing	3273
		Other Nonmetallic Mineral Product Manufacturing	3279
		Waste Treatment and Disposal	5622

Activity Type	Activity	Industry Group	NAICS Code
	Energy recovery	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Cement and Concrete Product Manufacturing	3273
		Other Nonmetallic Mineral Product Manufacturing	3279
	Recycling	Basic Chemical Manufacturing	3251
		Other Nonmetallic Mineral Product Manufacturing	3279
	Treatment	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Other Nonmetallic Mineral Product Manufacturing	3279
		Waste Treatment and Disposal	5622

Reference: U.S. EPA, 2019d

Table 6. Activities and Uses Reported to TRI for 1,1-Dichloroethane, Reporting Year 2017

Activity Type	Activity	Industry Group	NAICS Code
Manufacture	Produce	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Import	Basic Chemical Manufacturing	3251
	Produce or import for on-site use/processing	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Produce or import for sale/distribution	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Produce or import as a byproduct	Basic Chemical Manufacturing	3251

Activity Type	Activity	Industry Group	NAICS Code
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Produce or import as an impurity	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
Process	Process as a reactant	Basic Chemical Manufacturing	3251
	Process as an article component	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
	Process as an impurity	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
Otherwise Use	Otherwise use – ancillary or other use	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Other Nonmetallic Mineral Product Manufacturing	3279
		Waste Treatment and Disposal	5622
Waste Management	Disposal/releases	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Other Nonmetallic Mineral Product Manufacturing	3279
		Waste Treatment and Disposal	5622
	Energy recovery	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252
		Other Nonmetallic Mineral Product Manufacturing	3279
	Recycling	Basic Chemical Manufacturing	3251
	Treatment	Basic Chemical Manufacturing	3251
		Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	3252

Activity Type	Activity	Industry Group	NAICS Code
		Other Nonmetallic Mineral Product Manufacturing	3279
		Waste Treatment and Disposal	5622

Reference: U.S. EPA, 2019d

CDR and TRI Summary and Additional Information on Conditions of Use

For the 2016 CDR, 1,1-dichloroethane was not reported as used in the manufacture of commercial or consumer products. Two sites reported use of 1,1-dichloroethane as a reactant in basic organic chemical manufacturing and in chemical product and preparation manufacturing. One site reported that 1,1-dichloroethane was not recycled (e.g., not recycled, remanufactured, reprocessed, or reused) and one site reported this information as CBI.[11]

Between 2012 and 2016, the functional uses of 1,1-dichloroethane included processing as a reactant in basic organic chemical manufacturing and in chemical product and preparation manufacturing, as well as use in non-incorporative activities.

Information on industrial use of 1,1-dichloroethane was withheld between 2012 and 2016 to protect claims of CBI.[12] No consumer and commercial uses for 1,1-dichloroethane were reported to 2012 and 2016 CDR. Consumer uses were also identified in additional databases, which are included in the Exposure Potential section (Section 8).

TRI data reported in Part II Section 3 of the TRI Form R (“Activities and Uses of the Toxic Chemical at the Facility”) were compiled for Reporting Years (RY) 2011, 2015, and 2017. RY 2011, RY 2015, and RY 2017 reflect the chemical activities at reporting facilities in calendar years 2011, 2015, and 2017, respectively. Each facility filing a TRI Form R discloses activities that apply to the TRI chemical at the facility. The TRI data presented above are from the TRI dataset updated in April 2019. Tables 4, 5 and 6 present the activities and uses reported to TRI by industry group for 2011, 2015, and 2017. Waste management activity type includes all industry groups that reported to TRI using each waste management activity for 1,1-dichloroethane.

During the first public comment period for the draft high-priority designation of 1,1-dichloroethane, one public comment states that specific aerospace industrial uses include, but may not be limited to, heat resistant adhesives for primary and secondary structural and external metallic airframe parts, intermediates for the synthesis of organics, dispersants for plastics and elastomers, components of fumigants and insecticides, low friction and anti-knock coatings, bond primers, as a component in paint and varnish and paint removers, as a component of degreasing and cleaning solvents, and as a reagent. The commenter also stated that 1,1-dichloroethane can be used as a constituent in adhesives, intermediates, dispersants, fumigants

[11] At this time, “CBI” indicates that a data element has been claimed CBI by the information submitter; it does not reflect the result of an EPA substantiation review.
[12] At this time, “CBI” indicates that a data element has been claimed CBI by the information submitter; it does not reflect the result of an EPA substantiation review.

and insecticides, coatings and paint, paint removers, solvents, reagents, and as a constituent in making high vacuum rubber. (EPA-HQ-OPPT-2018-0426-0005).

Should the Agency decide to make a final decision to designate this chemical substance as a high-priority substance, further characterization of relevant TSCA conditions of use will be undertaken as part of the process of developing the scope of the risk evaluation.

4. Potentially exposed or susceptible subpopulations

Approach

In this review, EPA considered reasonably available information to identify potentially exposed or susceptible subpopulations, such as children, women of reproductive age, workers, consumers or the elderly. EPA analyzed processing and use information included on the CDR Form U. These data provide an indication about whether children or other susceptible subpopulation may be potentially exposed. EPA also used human health hazard information to identify potentially exposed or susceptible subpopulations.

Results and Discussion

At this stage, EPA identified children, women of reproductive age, workers and consumers as subpopulations who may be potentially exposed or susceptible subpopulations for 1,1-dichloroethane.

Children

EPA used data reported to the 2012 and 2016 CDR to identify uses in products and articles intended for children over time for 1,1 dichloroethane. The 2012 and 2016 CDR did not report any use in children's products. In the existing assessments reviewed, there was no discussion on the susceptibility of children to 1,1-dichloroethane. EPA also identified potential developmental hazards that would impact any stage of children's development.

Women of reproductive age (e.g., pregnant women per TSCA statute)

EPA identified studies that observed developmental effects following exposure to 1,1-dichloroethane (Section 7, Table 9). Although no reproductive hazards were identified, EPA considers women of reproductive age as potentially exposed. During the scoping and risk evaluation process, reproductive hazards will be considered again following a systematic search of the relevant scientific literature.

Consideration of women of reproductive age as a potentially exposed or susceptible subpopulation was also based on exposure because women of reproductive age are potential workers in the manufacturing, processing, distribution in commerce, use, or disposal of the chemical substance.

Workers

Please refer to the Exposure Potential section (Section 8) for a summary of potential occupational exposures, which EPA indicates that workers are potentially exposed or susceptible subpopulations based on greater exposure.

Consumers

Please refer to the Exposure Potential section (Section 8) for a summary of potential consumer exposures, which EPA indicates that consumers are potentially exposed or susceptible subpopulations based on greater exposure.

5. Persistence and bioaccumulation

Approach

EPA reviewed reasonably available information, such as physical and chemical properties and environmental fate characteristics, to understand 1,1-dichloroethane's persistence and bioaccumulation.

Physical and Chemical Properties and Environmental Fate Tables

Tables 7 and 8 summarize the physical and chemical properties and environmental fate characteristics of 1,1-dichloroethane, respectively.

Table 7. Physical and Chemical Properties of 1,1-Dichloroethane

Property or Endpoint	Value[a]	Reference
Molecular Formula	$C_2H_4Cl_2$	CRC Handbook (Rumble, 2018)
Molecular Weight	98.959 g/mol	CRC Handbook (Rumble, 2018)
Physical State	Liquid	CRC Handbook (Rumble, 2018)
Physical Form	Colorless, oily liquid	HSDB, 2018 citing NIOSH (2010)
Purity	Impurities include 0.02% ethyl chloride; 0.08% butylene oxide; 0.08% trichloroethylene; 0.01% ethylene dichloride; 0.14% unknown for reagent grade preparations	HSDB, 2018 citing ITC (1980)
Melting Point	−96.9 ºC	PhysProp Database (U.S. EPA, 2012c); ATSDR (2015)
Boiling Point	57.4 ºC	PhysProp Database (U.S. EPA, 2012c); ATSDR (2015)
	56.3 ºC	CRC Handbook (Rumble, 2018)
Density	1.175 g/mL	ATSDR (2015)
	1.1757 g/mL at 20 ºC	CRC Handbook (Rumble, 2018)
Vapor Pressure	227.3 mm Hg at 25 ºC[b]	Daubert and Danner (1989)
	230 mm Hg at 25 ºC	ATSDR (2015)

Property or Endpoint	Value[a]	Reference
Vapor Density	3.44 (relative to air)	HSDB (2018) citing NOAA (2018)
Water Solubility	5,040 mg/L at 25 ºC[b]	HSDB (2018) citing Horvath (1999)
	0.55 g/100 g at 20 ºC	ATSDR (2015)
Log Kow	1.79	Hansch (1995); ATSDR (2015)
Henry's Law Constant	5.62×10^{-3} atm-m^3/mol at 25 ºC[b]	ATSDR (2015); HSDB (2018) citing Gossett (1987)
	5.51×10^{-3} atm-m^3/mol at 25 ºC	ATSDR (2015)
Flash Point	−12 ºC (closed cup); 14 ºC (open cup)	ATSDR (2015)
	−17 ºC[b] (closed cup)	HSDB (2018) citing NFPA (2010)
	14 ºC[b] (open cup)	HSDB (2018) citing Bingham (2001)
Auto Flammability	457.8 ºC (autoignition temperature)[b]	ATSDR (2015); NFPA (2010)
	470 ºC (autoignition temperature)	HSDB (2018) citing Lewis and Sax (2004)
Viscosity	0.464 mPa second at 25 ºC; 0.362 mPa second at 50 ºC	HSDB (2018) citing Haynes (2014)
Refractive Index	1.4167 at 20 ºC	HSDB (2018) citing Haynes (2014)
Dielectric Constant	10.9 at 20 ºC	HSDB (2018) citing Dreher (2014)
Surface Tension	24.07 mN/m at 20 ºC	HSDB (2018) citing Haynes (2014)

Notes:
[a]Measured unless otherwise noted;
[b]Selected value
Reference: (U.S. EPA, 2019d)

Table 8. Environmental Fate Characteristics of 1,1-Dichloroethane

Property or Endpoint	Value[a]	Reference
Direct Photodegradation	Not expected to be susceptible to direct photolysis by sunlight because 1,1-dichloroethane does not contain chromophores that absorb at wavelengths >290 nm	HSDB (2018) citing Lyman (1990)
Indirect Photodegradation	$t_{1/2}$ = 39 days (based on 12-hour day; 1.5 × 10^6 ·OH/cm^3 from ·OH rate constant of 2.74 × 10^{-13} cm^3/molecules·second at 25 ºC)	PhysProp Database (U.S. EPA 2012c) citing Kwok and Atkinson (1994)
Hydrolysis	$t_{1/2}$ = 61.3 years at 25 ºC and pH 7	HSDB (2018) citing Jeffers (1989)
Biodegradation	31.1%/25 days reductive dechlorination to mainly chloroethane (14.5%) in sludge (anaerobic water)	ATSDR (2015)
	$t_{1/2}$ >30–60 days (anaerobic soil)	ATSDR (2015); Wood (1985)
	50%/7 days degradation and 19%/7 days evaporation at 5 ppm 1,1-dichloroethane and 29%/7 days degradation and 4%/7 days evaporation at 10 ppm (aerobic static-screening-flask test method with a municipal wastewater sewage inoculum)	HSDB (2018) citing Tabak (1981)
Wastewater Treatment	72% total removal (9% by biodegradation, 62% by volatilization to air, 1% to sludge; estimated)[b]	U.S. EPA (2012a)
Bioconcentration Factor	7 (estimated)[b]	U.S. EPA (2012a)
Bioaccumulation Factor	6.8 (estimated)[b]	U.S. EPA (2012a)
Soil Organic Carbon:Water Partition Coefficient (Log K_{oc})	1.48	HSDB (2018) citing Sabljić (1995)

Notes: [a]Measured unless otherwise noted; [b]EPI Suite™ physical property inputs: Log K_{OW} = 1.79, BP = 57.4 ºC, MP = -96.9 ºC, VP = 227 mm Hg, WS = 5,040 mg/L, BioP = 120, BioA = 30 and BioS = 30, SMILES C(Cl)(Cl)C
·OH = hydroxyl radical; OECD: Organisation for Economic Co-operation and Development; TG = test guideline; GC = gas chromatography; MITI = Ministry of International Trade and Industry; BOD = biochemical oxygen demand; HPLC = high performance liquid chromatography

Results and Discussion
1,1-Dichloroethane is a volatile, highly water-soluble liquid (5,040 mg/L). Measured Henry's Law constant (5.62×10^{-3} atm-m^3/mol) and vapor pressure (227.3 mm Hg) data indicate that this chemical will not be persistent in surface water and soil as it will likely volatilize upon release. In the air, 1,1-dichloroethane will likely exist in the vapor phase where it may react with photochemically produced hydroxyl radicals with an estimated half-life of 39 days. Given that the measured hydrolysis half-life for 1,1-dichloroethane is 61.3 years at pH 7, hydrolysis is not expected to be an important fate process for this chemical.

1,1-Dichloroethane may undergo some biodegradation under certain conditions. Under aerobic conditions, 29–50 percent 1,1-dichloroethane degraded over 7 days, and 4–19 percent was lost to evaporation in a static-screening-flask test using a municipal wastewater sewage inoculum. In anaerobic sludge, 31.1 percent 1,1-dichloroethane underwent reductive dichlorination over 25 days to yield chloroethane as the primary degradation product. Based on these results, 1,1-dichloroethane undergoes some biodegradation, but may persist in subsurface environments, groundwater, or enclosed pipes when volatilization is not an option. This chemical is expected to have low bioaccumulation potential based on its estimated bioconcentration factor and bioaccumulation factor of 7 and 6.8, respectively, along with its measured log K_{ow} of 1.79.

6. Storage near significant sources of drinking water

Approach
To support the proposed designation, EPA screened each chemical substance under its conditions of use with respect to the seven criteria in TSCA section 6(b)(1)(A) and 40 CFR 702.9. The statute specifically requires the Agency to consider the chemical substance's storage near significant sources of drinking water, which EPA interprets as direction to focus on the chemical substance's potential human health hazard and exposure.

EPA reviewed reasonably available information, specifically looking to identify certain types of existing regulations or protections for the proposed chemical substances. EPA considered the chemical substance's potential human health hazards, including to potentially exposed or susceptible subpopulations, by identifying existing National Primary Drinking Water Regulations under the Safe Drinking Water Act (40 CFR Part 141) and regulations under the Clean Water Act (CWA) (40 CFR 401.15). In addition, EPA considered the consolidated list of chemical substances subject to reporting requirements under the Emergency Planning and Community Right-to-Know Act (EPCRA; Section 302 Extremely Hazardous Substances and Section 313 Toxic Chemicals), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; Hazardous Substances), and the Clean Air Act (CAA) Section 112(r) (Regulated Chemicals for Accidental Release Prevention). Regulation by one of these authorities is an indication that the substance is a potential health or environmental hazard which, if released near a significant source of drinking water, could present an unreasonable risk of injury to human health or the environment.

Results and Discussion
1,1-Dichloroethane is a Priority Pollutant under the CWA and is subject to reporting requirements under the EPCRA. It is also considered a CERCLA hazardous substance and releases in quantities equal to or greater than 1,000 pounds are subject to reporting to the National Response Center under CERCLA. 1,1-Dichloroethane is subject to the CAA 112(r) for storage near significant sources of drinking water.

1,1-Dichloroethane is also subject to the Resource Conservation and Recovery Act (RCRA; hazardous waste number U076). RCRA directs EPA to develop and promulgate criteria for identifying the characteristics of hazardous waste, and for listing hazardous waste, taking into account toxicity, persistence, and degradability in nature, potential for accumulation in tissue and other related factors such as flammability, corrosiveness, and other hazardous characteristics.

7. Hazard potential

Approach
EPA considered reasonably available information from peer-reviewed assessments and databases to identify potential human health and environmental hazards for 1,1-dichloroethane (Tables 9 and 10, respectively) .

Because there are very few publicly available assessments for 1,1-dichloroethane with cited environmental hazard data, EPA used the infrastructure of ECOTOXicology knowledgebase (ECOTOX) to identify single chemical toxicity data for aquatic and terrestrial life (U.S. EPA, 2018c). It used a comprehensive chemical-specific literature search of the open literature that was conducted according to the Standard Operating Procedures (SOPs)[13]. The environmental hazard information was populated in ECOTOX and available to the public. In comparison to the approach used to survey human health hazard data, EPA also used a read-across approach to identify additional environmental hazard data for isomers of 1,1-dichloroethane, if available, to fill in potential data gaps when there were no reported observed effects for specific taxa exposed to the 1,1-dichloroethane (Table 10).

Potential Human Health and Environmental Hazard Tables
EPA identified potential human health and environmental hazards based on a review of the reasonably available information for 1,1-dichloroethane (Tables 9 and 10, respectively).

[13] The ECOTOX Standard Operating Procedures (SOPs) can be found at: https://cfpub.epa.gov/ecotox

Table 9. Potential Human Health Hazards Identified for 1,1-Dichloroethane

Human Health Hazards	Tested for Specific Effect	Effect Observed	Data Source
Acute Toxicity	X	X	ATSDR (2015), NICNAS (2015), OEHHA (2003)
Repeated Dose Toxicity	X	X	ATSDR (2015), U.S. EPA (2006), NICNAS (2015), OEHHA (2003)
Genetic Toxicity	X	X	ATSDR (2015), NICNAS (2015), OEHHA (2003)
Reproductive Toxicity			
Developmental Toxicity	X	X	ATSDR (2015), NICNAS (2015), OEHHA (2003)
Toxicokinetic	X		ATSDR (2015), NICNAS (2015), OEHHA (2003)
Irritation/Corrosion	X	X	NICNAS (2015)
Dermal Sensitization	X		NICNAS (2015)
Respiratory Sensitization			
Carcinogenicity	X	X	ATSDR (2015), U.S. EPA (1990), U.S. EPA (2006), NICNAS (2015), OEHHA (1992) OEHHA (2003), OEHHA (2011),
Immunotoxicity			
Neurotoxicity	X	X	ATSDR (2015), NICNAS (2015), OEHHA (2003)
Epidemiological Studies or Biomonitoring Studies	X		ATSDR (2015)

Note: The "X" in the "Effect Observed" column indicates when a hazard effect was reported by one or more of the referenced data sources. Blank rows indicate when information was not identified during EPA's review of reasonably available information to support the proposed designation.

Table 10. Potential Environmental Hazards Identified for 1,1-Dichloroethane

Media	Study Duration	Taxa Groups	High-Priority Chemical Candidate 1,1-Dichloroethane (CASRN 75-34-3)		Isomers of 1,1-Dichloroethane (CASRN 75-34-3) 1,2-Dichloroethane (CASRN 107-06-2) Dichloroethane (CASRN 1300-21-6)		Data Sources
			Number of Studies	Observed Effects	Number of Studies	Observed Effects	
Aquatic	Acute exposure	Vegetation	1	X	2	X	Tsai and Chen (2007); Wu et al. (2014)
		Invertebrate	1	X	14	X	Call et al. (1980); Foster and Tullis (1984); Foster and Tullis (1985); Freitag et al. (1994); Great Lakes Environment Center (2005); Kramer et al. (1983); LeBlanc (1980); Mayer and Ellersieck (1986); Price et al. (1974); Qureshi et al. (1982); Sanchez-Fortun et al. (1997); Sauvant et al. (1995a); Sauvant et al. (1995b); Sauvant et al. (1995c)
		Fish	1	X	5	X	Buccafusco et al. (1981); Geiger et al. (1985); Great Lakes Environment Center (2005); Heitmuller et al. (1981); Mayer and Ellersieck (1986); Walbridge et al. (1983)
		Non-Fish Vertebrates (i.e., amphibians, reptiles, mammals)	-		-		
	Chronic exposure	Vegetation	-		-		
		Invertebrate	-		1	X	Call et al. (1980)
		Fish	-		4	X	Ahmad et al. (1984); Barrows et al. (1980); Benoit et al. (1982); Black et al. (1982)
		Non-Fish Vertebrates (i.e., amphibians, reptiles, mammals)	-		2	X	Black et al. (1982)

Media	Study Duration	Taxa Groups	High-Priority Chemical Candidate 1,1-Dichloroethane (CASRN 75-34-3)		Isomers of 1,1-Dichloroethane (CASRN 75-34-3) 1,2-Dichloroethane (CASRN 107-06-2) Dichloroethane (CASRN 1300-21-6)		Data Sources
			Number of Studies	Observed Effects	Number of Studies	Observed Effects	
Terrestrial	Acute exposure	Vegetation	1	X	1	X	Crebelli et al. (1988)
		Invertebrate	-		4	X	Neuhauser et al. (1985); Bhatia and Bansode (1971); Bang and Telford (1966); Leesch (1984)
		Vertebrates	-		4	X	Kitchin et al. (1993); Sasaki et al. (1998), Crebelli et al. (1999); Crebelli et al. (1995)
	Chronic exposure	Vegetation	1	X	2	X	Lewis et al. (1979); Dietz and Schnoor (2001)
		Invertebrate	-		15	X	Lindgren et al. (1954); Bang and Telford (1966); Punj (1970); Shivanandappa and Rajendran (1987); Jefferson (1942)
		Vertebrates	-		1	X	Witt et al. (2000)

The dash indicates that no studies relevant for environmental hazard were identified during the initial review and thus the "Observed Effects" column is left blank. The "X" in the "Observed Effects" column indicates when a hazard effect was reported by one or more of the referenced studies. The "N/A" in the "Observed Effects" column indicates when a hazard effect was not reported by one of the referenced studies' abstract (full reference review has not been conducted).

8. Exposure potential

Approach
EPA considered reasonably available information to identify potential environmental, worker/occupational, consumer and general population exposures to 1,1-dichloroethane.

Release potential for environmental and human health exposure

In addition to other required information, a submission of a TRI Form R report must include the quantities of a TRI chemical the facility released on-site to air, water, or land, and the quantities it transferred off-site to another facility for further waste management. On-site release quantities are reported in Part II Section 5 of the TRI Form R, and off-site transfers are reported in Part II Section 6. Waste management activities include: transfers of a TRI chemical in wastewater to a publicly owned treatment works (POTW) facility or to a non-POTW wastewater treatment facility for the purpose of treatment for destruction or removal; combustion for energy recovery; treatment (treatment includes treatment via incineration for destruction and waste stabilization); recycling; and release, including disposal. During treatment, combustion for energy recovery, or recycling activities, it is possible that some of the quantities of the TRI chemical will be released to the environment.

Worker/Occupational and consumer exposure
EPA's approach for assessing exposure potential was to review the physical and chemical properties, conditions of use reported in CDR, and information from the National Institutes of Health Consumer Product Database and the Chemical and Products Database (CPDat) for 1,1-dichloroethane to inform occupational and consumer exposure potential. The results of this review are detailed in the following tables.

General population exposure
EPA identified environmental concentration, human and environmental biomonitoring data to inform 1,1-dichloroethane's exposure potential to the general population (Table 13).

Results and Discussion
Release potential for environmental and human health exposure
Aggregated quantities of 1,1-dichloroethane released on-site to air, water, and land, and aggregated quantities of 1,1-dichloroethane transferred off-site to POTW and other wastewater treatment facilities (non-POTW) are presented in Table 11 for RY 2011, 2015, and 2017. The table does not include any of the reported quantities pertaining to other waste management activities (e.g., recycling, combustion for destruction) that occurred on-site or off-site during RY 2011, 2015, and 2017. The "Number of Facilities" is the count of unique facilities that filed a TRI Form R report for 1,1-Dichloroethane for RY 2011, 2015, and 2017. The TRI data presented were obtained from the TRI dataset following its update in April 2019.

Table 11. The TRI Data on 1,1-Dichloroethane from Reporting Years 2011, 2015, and 2017 and Used in this Document to Assess Exposure Potential

Year	Number of Facilities That Reported	Total Quantities Released On-Site to Air (pounds)	Total Quantities Released On-Site to Water (pounds)	Total Quantities Released (Disposed of) On-Site to Land (pounds)	Total Quantities Transferred to POTW (pounds)	Total Quantities Transferred to Other (Non-POTW) Wastewater Treatment Facilities (pounds)
2011	15	9,026	5	415	0	0
2015	18	9,361	2	1	0	0
2017	16	8,599	0	0	0	5

POTW = publicly owned treatment works
Reference: U.S. EPA, 2019d

For RY 2017, sixteen facilities reported to TRI for 1,1-dichloroethane. The total quantities of 1,1-dichloroethane these facilities released on-site to air (as fugitive and stack emissions), surface water, and land are: 8,599 pounds; 0 pounds; and 0 pounds, respectively. These facilities reported zero pounds of the chemical transferred to POTW and 5 pounds transferred off-site to other non-POTW wastewater treatment facilities for the purpose of wastewater treatment. These transfer categories represent two types of off-site transfers for wastewater treatment that may lead to releases from the receiving facilities. They do not include quantities sent off-site for other types of waste management activities that include, or may lead to, releases of the chemical.

Quantities transferred off-site represent the amount of a toxic chemical a facility sent off-site prior to any waste management (e.g., treatment) at a receiving facility. Some of the quantities of 1,1-dichloroethane received by the non-POTW wastewater treatment facilities may have been released to surface waters or to air during treatment processes at the facilities.

1,1-Dichloroethane has a vapor pressure of around 230 mm Hg at 25 ºC. This chemical's vapor pressure indicates potential for air releases from volatilization during manufacturing, processing and use.

Worker/Occupational exposure
Worker exposures to this chemical may be affected by many factors, including but not limited to volume produced, processed, distributed, used and disposed of; physical form and concentration; processes of manufacture, processing, and use; chemical properties such as vapor pressure, solubility, and water partition coefficient; local temperature and humidity; and exposure controls such as engineering controls, administrative controls, and the existence of a personal protective equipment (PPE) program.

1,1-dichloroethane has an Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) [14]. The PEL is 100 parts per million (ppm) or 450 milligrams (mg)/cubic

[14] OSHA, 2009. Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs). https://www.osha.gov/dsg/annotated-pels/tablez-1.html

meter (m^3) over an 8-hour work day, time weighted average (TWA). This chemical also has a National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL)[15] of 100 ppm (450 mg/m^3) TWA. The American Conference of Governmental Industrial Hygienists (ACGIH) set the Threshold Limit Value (TLV) at 100 ppm TWA.

1,1-Dichloroethane has a vapor pressure of approximately 230 mm Hg at 25 ºC/77 F. 1,1-Dichloroethane's vapor pressure indicates the potential for inhalation exposure to vapors generated by the liquid at ambient room temperature conditions.

Consumer exposure
The 2012 CDR, 2016 CDR, and the National Institutes of Health Consumer Product Database did not report on the use of 1,1-dichloroethane in consumer products. However, according to the Chemical and Products Database (CPDat) and ATSDR (2015), 1,1-dichloroethane may be present in consumer products such as paint removers and fragrances (Table 12).

Table 12. Exposure Information for Consumers

Chemical Identity	Consumer Product Database
	Consumer Uses (List)
1,1-Dichloroethane (75-34-3)	Fragrance

Reference: CPDat

General population exposure
1,1-dichloroethane was reported in air, water, and soil/sediment environmental concentrations, as well as in human blood and aquatic, non-mammalian ecological biomonitoring data. A summary of the studies from peer-reviewed databases is presented in Table 13.

Table 13. Exposure Information for the Environment and General Population

Database Name	Env. Concen. Data Present?	Human Biomon. Data Present?	Ecological Biomon. Data Present?	Reference
California Air Resources Board	no	no	no	CARB (2005)
Comparative Toxicogenomics Database	no	no	no	MDI (2002)
EPA Ambient Monitoring Technology Information Center – Air Toxics Data	yes	no	no	U.S. EPA (1990b)
EPA Discharge Monitoring Report Data	yes	no	no	U.S. EPA (2007)
EPA Unregulated Contaminant Monitoring Rule	yes	no	no	U.S. EPA (1996)
FDA Total Diet Study	no	no	no	FDA (1991)
Great Lakes Environmental Database	yes	no	no	U.S. EPA (2018d)

[15] NIOSH, 2005. NIOSH Pocket Guide to Chemical Hazards. https://www.cdc.gov/niosh/npg/npgdcas.html

Database Name	Env. Concen. Data Present?	Human Biomon. Data Present?	Ecological Biomon. Data Present?	Reference
Information Platform for Chemical Monitoring Data	yes	no	no	EC (2018)
International Council for the Exploration of the Sea	no	no	no	ICES (2018)
OECD Monitoring Database	no	no	no	OECD (2018)
Targeted National Sewage Sludge Survey	no	no	no	U.S. EPA (2006b)
The National Health and Nutrition Examination Survey	no	yes	no	CDC (2013)
USGS Monitoring Data –National Water Quality Monitoring Council	no	no	no	USGS (1991a)
USGS Monitoring Data –National Water Quality Monitoring Council, Air	yes	no	no	USGS (1991b)
USGS Monitoring Data –National Water Quality Monitoring Council, Ground Water	yes	no	no	USGS (1991c)
USGS Monitoring Data –National Water Quality Monitoring Council, Sediment	yes	no	no	USGS (1991d)
USGS Monitoring Data –National Water Quality Monitoring Council, Soil	yes	no	no	USGS (1991e)
USGS Monitoring Data –National Water Quality Monitoring Council, Surface Water	yes	no	no	USGS (1991f)
USGS Monitoring Data –National Water Quality Monitoring Council, Tissue	no	no	yes	USGS (1991g)

[a] Concen.= concentration
[b] Biomon.= biomonitoring

EPA anticipates releases of 1,1-dichloroethane into the environment because of the conditions of use for 1,1-dichloroethane, particularly activities associated with its production and use as a solvent, cleaning agent, degreaser and its use as an intermediate in the manufacturing of 1,1,1-trichloroethane, vinyl chloride, and high-vacuum rubber. Releases of 1,1-dichloroethane from certain conditions of use, such as manufacturing, disposal, or hazardous waste treatment activities, may result in general population exposures, mostly via inhalation of ambient air and ingestion of contaminated drinking water near emission sources, whereas presence in food sources is considered very unlikely (ATSDR 2015, CalEPA 2003).

Based on fate properties, such as vapor pressure, Henry's Law constant, soil mobility and water solubility, EPA anticipates possible presence of 1,1-dichloroethane in ambient air, and to a lesser extent in surface water, groundwater, and soil (ATSDR 2015, RIVM 2007). Existing assessments reported 1,1-dichloroethane in ambient air, waste gas from garbage dumps, surface water, groundwater, drinking water, and other environmental media (ATSDR 2015, CalEPA 2003).

9. Other risk-based criteria that EPA determines to be relevant to the designation of the chemical substance's priority

EPA did not identify other risk-based criteria relevant to the designation of the chemical substance's priority.

10. Proposed designation and Rationale

Proposed designation: High-priority substance

Rationale: EPA identified and analyzed reasonably available information for exposure and hazard and is proposing to find that 1,1-dichloroethane may present an unreasonable risk of injury to health and/or the environment, including potentially exposed or susceptible subpopulations, (e.g., workers, consumers, women of reproductive age, children). This is based on the potential hazard and potential exposure of 1,1-dichloroethane under the conditions of use described in this document to support the prioritization designation. Specifically, EPA expects that the manufacturing, processing, distribution, use and disposal of 1,1-dichloroethane may result in presence of the chemical in surface water and groundwater, ingestion of the chemical in drinking water, inhalation of the chemical from air releases, and exposure to workers and exposure to the general population, including exposure to children. In addition, EPA identified potential environmental (e.g., aquatic toxicity, terrestrial toxicity), and human health hazards (e.g., acute toxicity, repeated dose toxicity, genetic toxicity, developmental toxicity, irritation/corrosion, carcinogenicity, and neurotoxicity).

11. References

Note: All hyperlinked in-text citations are also listed below

Ahmad, N; Benoit, D; Brooke, L; Call, D; Carlson, A; Defoe, D; Huot, J; Moriarity, A; Richter, J; Shubat, P; Veith, G; Wallbridge, C. (1984). Aquatic toxicity tests to characterize the hazard of volatile organic chemicals in water: A toxicity data summary--Parts I and II (pp. 103). (EPA 600/3-84-009). Duluth, MN: U.S. Environmental Protection Agency.

ATSDR (Agency for Toxic Substances and Disease Registry). (2015). Toxicological profile for 1,1-dichloroethane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry. https://www.atsdr.cdc.gov/ToxProfiles/tp133.pdf

Bang, YH; Telford, HS. (1966). Effect of sublethal doses of fumigants on stored-grain insects (pp. 22 p.). Pullman, WA: Washington University.

Barrows, ME; Petrocelli, SR; Macek, KJ; Carroll, JJ. (1980). Bioconcentration and elimination of selected water pollutants by bluegill sunfish (Lepomis macrochirus). In R Haque (Ed.), (pp. 379-392). Ann Arbor, MI: Ann Arbor Science.

Benoit, DA; Puglisi, FA; Olson, DL. (1982). A fathead minnow Pimephales promelas early life stage toxicity test method evaluation and exposure to four organic chemicals. Environmental Pollution - Series A: Ecological and Biological 28: 189-197. http://dx.doi.org/10.1016/0143-1471(82)90075-7

Bhatia, SK; Bansode, PC. (1971). Studies on resistance to insecticides in Tribolium castaneum (Herbst). IV. Susceptibility of p,p'-DDT-resistant strain to some fumigants. Indian Journal of Entomology 33: 45-49.

Bingham, E; Cohrssen, B; Powell, CH. (2001). Patty's toxicology. In E Bingham; B Cohrssen; CH Powell (Eds.), (5th ed.). Hoboken, NJ: John Wiley & Sons. http://dx.doi.org/10.1002/0471125474

Black, JA; Birge, WJ; McDonnell, WE; Westerman, AG; Ramey, BA; Bruser, DM. (1982). The aquatic toxicity of organic compounds to embryo-larval stages of fish and amphibians. (Research Report No. 133). Lexington, KY: University of Kentucky.

Buccafusco, RJ; Ells, SJ; LeBlanc, GA. (1981). Acute toxicity of priority pollutants to bluegill (Lepomis macrochirus). Bulletin of Environmental Contamination and Toxicology 26: 446-452. http://dx.doi.org/10.1007/BF01622118

CARB (California Air Resources Board). (2005). California Air Resources Board (CARB): Indoor air pollution in California [Database]. Retrieved from https://www.arb.ca.gov/research/apr/reports/l3041.pdf

Call, DJ; Brooke, LT; Ahmad, N. (1980). Toxicity, bioconcentration, and metabolism of selected chemicals in aquatic organisms: Fourth quarterly progress report to EPA (1 January - 31 March 1980) (pp. 80). (U.S. EPA Cooperative Agreement No. CR 806864020).

CDC (Centers for Diseases Control and Prevention). (2013). National Health and Nutrition Examination Survey Data (NHANES) [Database]. Atlanta, GA: CDC, National Center for Health Statistics. Retrieved from https://www.cdc.gov/nchs/nhanes/index.htm

Crebelli, R; Andreoli, C; Carere, A; Conti, L; Crochi, B; Cotta-Ramusino, M; Benigni, R. (1995). Toxicology of halogenated aliphatic hydrocarbons: Structural and molecular determinants for the disturbance of chromosome segregation and the induction of lipid peroxidation. Chemico-Biological Interactions 98: 113-129. http://dx.doi.org/10.1016/0009-2797(95)03639-3

Crebelli, R; Benigni, R; Franekic, J; Conti, G; Conti, L; Carere, A. (1988). Induction of chromosome malsegregation by halogenated organic solvents in Aspergillus nidulans: Unspecific or specific mechanism? Mutation Research 201: 401-411. http://dx.doi.org/10.1016/0027-5107(88)90027-9

Crebelli, R; Carere, A; Leopardi, P; Conti, L; Fassio, F; Raiteri, F; Barone, D; Ciliutti, P; Cinelli, S; Vericat, JA. (1999). Evaluation of 10 aliphatic halogenated hydrocarbons in the mouse bone marrow micronucleus test. Mutagenesis 14: 207-215. http://dx.doi.org/10.1093/mutage/14.2.207

Daubert, TE; Danner, RP. (1989). Physical and thermodynamic properties of pure chemicals: Data compilation. Washington, DC: Taylor & Francis.

Dietz, AC; Schnoor, JL. (2001). Phytotoxicity of chlorinated aliphatics to hybrid poplar (Populus deltoides x nigra DN34). Environmental Toxicology and Chemistry 20: 389-393. http://dx.doi.org/10.1897/1551-5028(2001)020<0389:POCATH>2.0.CO;2

Dreher, EL; Beutel, KK; Myers, JD; Lübbe, T; Krieger, S; Pottenger, LH. (2014). Chloroethanes and chloroethylenes. In B Elvers (Ed.), Ullmann's Encyclopedia of Industrial Chemistry (6th ed., pp. 1-81). Hoboken, NJ: Wiley-VCH Verlag GmbH & Co. http://dx.doi.org/10.1002/14356007.o06_o01.pub2

EC (European Commission). (2018). Information Platform for Chemical Monitoring Data (IPCHEM) [Database]. Retrieved from https://ipchem.jrc.ec.europa.eu/RDSIdiscovery/ipchem/index.html

FDA (U.S. Food and Drug Administration). (1991). FDA Total Diet Study [Database]. Retrieved from http://www.fda.gov/Food/FoodScienceResearch/TotalDietStudy/ucm184293.htm

Foster, G; Tullis, RE. (1984). A quantitative structure-activity relationship between partition coefficients and the acute toxicity of naphthalene derivatives in Artemia salina nauplii. Aquatic Toxicology AMST: 245-254. http://dx.doi.org/10.1016/0166-445X(84)90023-7

Foster, GD; Tullis, RE. (1985). Quantitative structure-toxicity relationships with osmotically stressed Artemia salina nauplii. Environmental Pollution Series A, Ecological and Biological 38: 273-281. http://www.sciencedirect.com/science/article/pii/0143147185901321

Freitag, D; Ballhorn, L; Behechti, A; Fischer, K; Thumm, W. (1994). Structural configuration and toxicity of chlorinated alkanes. Chemosphere 28: 253-259. http://dx.doi.org/10.1016/0045-6535(94)90122-8

Geiger, DL; Northcott, CE; Call, DJ; Brooke, LT. (1985). Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas): Volume II. Superior, WI: University of Wisconsin-Superior, Center for Lake Superior Environmental Studies.

Gossett, JM. (1987). Measurement of Henry's law constants for C1 and C2 chlorinated hydrocarbons. Environmental Science & Technology 21: 202-208. https://doi.org/10.1021/es00156a012

Great Lakes Environment Center. (2005). Final Report on Acute Toxicity of Selected Chemicals in Support of the Great Lakes Water Quality Guidance Final Rep.Gt.Lakes Environ.Ctr.,Traverse City, MI:35.

Hansch, C; Leo, A; Hoekman, D. (1995). Exploring QSAR: Hydrophobic, electronic, and steric constants. Washington, DC: American Chemical Society.

Haynes, WM; Lide, DR; Bruno, TJ. (2014). CRC handbook of chemistry and physics (95th ed.). Boca Raton, FL: CRC Press.

Health and Safety Authority (HSA). (2018). 2018 Code of practice for the chemical agents regulations. Dublin, Ireland: Health and Safety Authority. https://www.hsa.ie/eng/Publications_and_Forms/Publications/Chemical_and_Hazardous_Substances/Chemical_Agents_COP_2018.pdf

Heitmuller, PT; Hollister, TA; Parrish, PR. (1981). Acute toxicity of 54 industrial chemicals to sheepshead minnows (Cyprinodon variegatus). Bulletin of Environmental Contamination and Toxicology 27: 596-604. http://dx.doi.org/10.1007/BF01611069

Horvath, AL; Getzen, FW; Maczynska, Z. (1999). IUPAC-NIST solubility data series 67: Halogenated ethanes and ethenes with water. Journal of physical and chemical reference data 28: 395-627. http://dx.doi.org/10.1063/1.556039

HSDB (Hazardous Substances Data Bank). (2018). 1,1-Dichloroethane (CASRN: 75-34-3). Available online at http://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?dbs+hsdb:@term+@DOCNO+64

ICES (International Council for the Exploration of the Sea). (2018). ICES-Dome [Database]. Retrieved from http://www.ices.dk/marine-data/data-portals/Pages/DOME.aspx

ITC/U.S. EPA. (1980); Information Review #209 (Draft) Chloroethanes p.2.

Jeffers, PM; Ward, LM; Woytowitch, LM; Wolfe, NL. (1989). Homogeneous hydrolysis rate constants for selected chlorinated methanes, ethanes, ethenes, and propanes. Environmental Science and Technology 23: 965-969. http://dx.doi.org/10.1021/es00066a006

Jefferson, RN. (1942) The influence of carbon tetrachloride on the toxic efficiency of certain volatile organic compounds. (Doctoral Dissertation). Iowa State University, Ames, IA.

Kitchin, KT; Brown, JL; Kulkarni, AP. (1993). Predicting rodent carcinogenicity of halogenated hydrocarbons by in vivo biochemical parameters. Birth Defects Research, Part B: Developmental and Reproductive Toxicology 13: 167-184.

Kramer, VC; Schnell, DJ; Nickerson, KW. (1983). Relative toxicity of organic solvents to Aedes aegypti larvae. Journal of Invertebrate Pathology 42: 285-287. http://dx.doi.org/10.1016/0022-2011(83)90076-9

Kwok, ESC; Atkinson, R. (1994). Estimation of hydroxyl radical reaction rate constants for gas-phase organic compounds using a structure-reactivity relationship: An update. (CMA Contract No. ARC-8.0-OR). Riverside, CA: University of California.

LeBlanc, GA. (1980). Acute toxicity of priority pollutants to water flea (Daphnia magna). Bulletin of Environmental Contamination and Toxicology 24: 684-691. http://dx.doi.org/10.1007/BF01608174

Leesch, JG. (1984). Fumigation of lettuce: Efficacy and phytotoxicity. Journal of Economic Entomology 77: 142-150.

Lewis, JA; Papavizas, GC; O'Neill, NR. (1979). Effect of seed immersion in organic solvents on germinability. Journal of Agricultural Science 92: 563-570. http://dx.doi.org/10.1017/S0021859600053806

Lewis, RJ, Sr; Sax, NI. (2004). Sax's dangerous properties of industrial materials (11th ed.). Hoboken, NJ: John Wiley & Sons.

Lindgren, D; Vincent, L; Krohne, H. (1954). Relative effectiveness of ten fumigants to adults of eight species of stored-product insects. Journal of Economic Entomology 47: 923-926.

Lyman, WJ; Reehl, WF; Rosenblatt, DH. (1990). Handbook on chemical property estimation methods (pp. 8-3). Washington, DC: American Chemical Society.

Mayer, FL; Ellersieck, MR. (1986). Manual of acute toxicity: Interpretation and data base for 410 chemicals and 66 species of freshwater animals. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service.

MDI (MDI Biological Laboratory). (2002). Comparative Toxicogenomics Database (CTD) [Database]. Retrieved from http://ctdbase.org

NICNAS (National Industrial Chemicals Notification and Assessment Scheme). (2015). Ethane, 1,1-dichloro-: Human health tier II assessment. Sydney, Australia: Australian Department of Health, National Industrial Chemicals Notification and Assessment Scheme. https://www.nicnas.gov.au/chemical-information/imap-assessments/imap-assessment-details?assessment_id=1338#cas-A_75-34-3

Neuhauser, EF; Loehr, RC; Malecki, MR; Milligan, DL; Durkin, PR. (1985). The toxicity of selected organic chemicals to the earthworm Eisenia fetida. Journal of Environmental Quality 14: 383-388.

NFPA (National Fire Protection Association). (2010). Fire protection guide to hazardous materials (14th ed.). Quincy, MA.

NIOSH (National Institute for Occupational Safety & Health). (2010). NIOSH Pocket Guide to Chemical Hazards. Cincinnati, Ohio: U.S. Department of Health & Human Services, Centers for Disease Control & Prevention. https://www.cdc.gov/niosh/npg/npgdcas.html

NIOSH (National Institute for Occupational Safety & Health). (2018). NIOSH pocket guide to chemical hazards: 1,1-Dichloroethane. Atlanta, GA: United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. http://www.cdc.gov/niosh/npg/npgd0194.html

NOAA (National Oceanic and Atmospheric Administration). (2018). CAMEO chemicals. Database of hazardous materials. 1,1-Dichloroethane (75-34-3). Available online at http://cameochemicals.noaa.gov/

OECD (Organisation for Economic Co-operation and Development). (2018). OECD Monitoring Database [Database]. http://www.oecd.org

OEHHA (California Office of Environmental Health Hazard Assessment). (1992). Expedited cancer potency values and proposed regulatory levels for certain Proposition 65 carcinogens. California: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Reproductive and Cancer Hazard Assessment Section. https://oehha.ca.gov/media/downloads/proposition-65/report/expcancer.pdf

OEHHA (California Office of Environmental Health Hazard Assessment). (2003). Public health goals for chemicals in drinking water: 1,1-Dichloroethane in drinking water. California: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Pesticide and Environmental Toxicology Section. https://oehha.ca.gov/media/downloads/water/public-health-goal/ph411dca92603.pdf

OEHHA (California Office of Environmental Health Hazard Assessment). (2011). Appendix B: Chemical-specific summaries of the information used to derive unit risk and cancer potency values. California: California Environmental Protection Agency, Office of Environmental Health

Hazard Assessment, Air Toxicology and Epidemiology Branch. https://oehha.ca.gov/media/downloads/crnr/appendixb.pdf

OSHA (Occupational Safety and Health Administration (OSHA). (2009). Permissible Exposure Limits (PELs). https://www.osha.gov/dsg/annotated-pels/tablez-1.html

OSHA (Occupational Safety and Health Administration). (2018). Table Z-1 Limits for air contaminants. Washington, DC: U.S. Department of Labor, Occupational Safety and Health Administration. https://www.osha.gov/dsg/annotated-pels/tablez-1.html

Price, KS; Waggy, GT; Conway, RA. (1974). Brine shrimp bioassay and seawater BOD of petrochemicals. Water Environment and Technology 46: 63-77.

Punj, GK. (1970). The effect of nutrition on the susceptibility of larvae of Trogoderma granarium Everts (Coleoptera, Dermestidae) to certain fumigants. Journal of Stored Products Research 6: 181-185.

Qureshi, A; Flood, K; Thompson, S; Janhurst, S; Inniss, C; Rokosh, D. (1982). Comparison of a luminescent bacterial test with other bioassays for determining toxicity of pure compounds and complex effluents. In Aquatic Toxicology and Hazard Assessment. West Conshohocken, PA: ASTM International.

RIVM (National Institute for Public Health and the Environment (Netherlands). (2007). Ecotoxicologically based environmental risk limits for several volatile aliphatic hydrocarbons (pp. 217). (601782002/2007). Bilthoven, Netherlands: National Institute for Public Health and the Environment (RIVM). https://www.rivm.nl/bibliotheek/rapporten/601782002.pdf

Rumble, JR. (2018). CRC handbook of chemistry and physics. In JR Rumble (Ed.), (99th ed.). Boca Raton, FL: CRC Press.

Sabljić, A; Güsten, H; Verhaar, H; Hermens, J. (1995). QSAR modelling of soil sorption. Improvements and systematics of log KOC vs. log KOW correlations. Chemosphere 31: 4489-4514. http://www.sciencedirect.com/science/article/pii/0045653595003275

Sanchez-Fortun, S; Sanz, F; Santa-Maria, A; Ros, JM; De Vicente, ML; Encinas, MT; Vinagre, E; Barahona, MV. (1997). Acute sensitivity of three age classes of Artemia salina larvae to seven chlorinated solvents. Bulletin of Environmental Contamination and Toxicology 59: 445-451. http://dx.doi.org/10.1007/s001289900498

Sasaki, YF; Saga, A; Akasaka, M; Ishibasi, S; Yoshida, K; Su, QY; Matsusaka, N; Tsuda, S. (1998). Detection of in vivo genotoxicity of haloalkanes and haloalkenes carcinogenic to rodents by the alkaline single cell gel electrophoresis (comet) assay in multiple mouse organs. Mutation Research: Genetic Toxicology and Environmental Mutagenesis 419: 13-20. http://dx.doi.org/10.1016/S1383-5718(98)00114-4

Sauvant, MP; Pepin, D; Bohatier, J; Groliere, CA. (1995a). Microplate technique for screening and assessing cytotoxicity of xenobiotics with Tetrahymena pyriformis. Ecotoxicology and Environmental Safety 32: 159-165.
http://www.sciencedirect.com/science/article/pii/S0147651385710974

Sauvant, MP; Pepin, D; Bohatier, J; Groliere, CA. (1995b). Comparison of six bioassays for assessing in vitro acute toxicity and structure-activity relationships for vinyl chloride monomer, its main metabolites and derivatives. Science of the Total Environment 172: 79-92.
http://dx.doi.org/10.1016/0048-9697(95)04782-4

Sauvant, MP; Pépin, D; Grolière, CA; Bohatier, J. (1995c). Effects of organic and inorganic substances on the cell proliferation of L-929 fibroblasts and Tetrahymena pyriformis GL protozoa used for toxicological bioassays. Bulletin of Environmental Contamination and Toxicology 55: 171-178. http://dx.doi.org/10.1007/BF00203006

Shivanandappa, T; Rajendran, S. (1987). Induction of glutathione S-transterase by fumigants in larvae of the Khapra beetle, Trogoderma granarium (E.). Pesticide Biochemistry and Physiology 28: 121-126.

Tabak, HH; Quave, SA; Mashni, CI; Barth, EF. (1981). Biodegradability studies with organic priority pollutant compounds. Journal of water pollution control federation 53: 1503-1518.

Tsai, KP; Chen, CY. (2007). An algal toxicity database of organic toxicants derived by a closed-system technique. Environmental Toxicology and Chemistry 26: 1931-1939.
http://dx.doi.org/10.1897/06-612R.1

U.S. EPA (U. S. Environmental Protection Agency). (1990a). Integrated Risk Information System (IRIS) chemical assessment summary: 1,1-Dichloroethane; CASRN 75-34-3. Washington, DC: U.S. Environmental Protection Agency, National Center for Environmental Assessment. https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0409_summary.pdf

U.S. EPA (U.S. Environmental Protection Agency). (1990b). EPA Ambient Monitoring Technology Information Center (AMTIC): Air toxics data [Database]. Retrieved from https://www3.epa.gov/ttnamti1/toxdat.html

U.S. EPA (U.S. Environmental Protection Agency). (1996). EPA Unregulated Contaminant Monitoring Rule (UCMR) [Database]. Retrieved from https://www.epa.gov/dwucmr

U.S. EPA (U.S. Environmental Protection Agency). (2000). Memorandum within U.S. EPA concerning a fathead minnow early life stage toxicity test with attachment (pp. 13). (EPA/OTS Doc.#40-8247020).

U.S. EPA (U. S. Environmental Protection Agency). (2006a). Provisional peer-review toxicity values for 1,1-dichloroethane (CASRN 75-34-3). Cincinnati, OH: U.S. Environmental Protection Agency, National Center for Environmental Assessment, Superfund Health Risk Technical Support Center. https://hhpprtv.ornl.gov/issue_papers/Dichloroethane11.pdf

U.S. EPA (U.S. Environmental Protection Agency). (2006b). Targeted National Sewage Sludge Survey (TNSSS) [Database]. Retrieved from https://www.epa.gov/biosolids/sewage-sludge-surveys

U.S. EPA (U.S. Environmental Protection Agency). (2007). EPA Discharge Monitoring Report Data (EPA DMR) [Database]. Retrieved from https://cfpub.epa.gov/dmr/

U.S. EPA (U.S. Environmental Protection Agency). (2010). 2006 Inventory Update Rule (IUR) U.S. Environmental Protection Agency. https://www.epa.gov/chemical-data-reporting/downloadable-2006-iur-public-database

U.S. EPA (U.S. Environmental Protection Agency). (2012a). Estimation Programs Interface Suite for Microsoft Windows, v. 4.11. Washington, DC: U.S. Environmental Protection Agency. https://www.epa.gov/tsca-screening-tools/download-epi-suitetm-estimation-program-interface-v411

U.S. EPA (U.S. Environmental Protection Agency). (2012b). Non-confidential 2012 chemical data reporting (CDR) database. Washington, D.C.: U.S. Environmental Protection Agency. http://www.epa.gov/cdr/

U.S. EPA (U.S. Environmental Protection Agency). (2012c). PhysProp database. Estimation Programs Interface Suite™ for Microsoft® Windows, v 4.11: CASRN 75-34-3 [Fact Sheet]. Washington, DC: U.S. Environmental Protection Agency. https://www.epa.gov/tsca-screening-tools/epi-suitetm-estimation-program-interface

U.S. EPA (U.S. Environmental Protection Agency) (2012d). TSCA Work Plan Chemicals: Methods Document. Washington, DC. U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. February 2012. https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/tsca-work-plan-methods-document

U.S. EPA (U.S. Environmental Protection Agency) (2013). 1986-2002 Inventory Update Reporting rule data (Non-confidential Production Volume in Pounds). Washington, DC. U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. Retrieved: August 9, 2013.

U.S. EPA (U.S. Environmental Protection Agency) (2015). Consolidated list of lists under EPCRA/CERCLA/CAA §112(r) (March 2015 Version). Washington, DC: U.S. Environmental Protection Agency. https://www.epa.gov/epcra/consolidated-list-lists-under-epcracerclacaa-ss112r-march-2015-version

U.S. EPA (U.S. Environmental Protection Agency). (2016). Non-confidential 2016 chemical data reporting (CDR) database. Washington, D.C.: U.S. Environmental Protection Agency. http://www.epa.gov/cdr/

U.S. EPA (U.S. Environmental Protection Agency) (2017). Chemical Data Reporting (2012 and 2016 Public CDR database). Washington, DC. U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. Retrieved from ChemView: June 2019.

U.S. EPA (U. S. Environmental Protection Agency). (2018a). Table 1. Prioritized chronic dose-response values. Washington, DC: U.S. Environmental Protection Agency. https://www.epa.gov/sites/production/files/2014-05/documents/table1.pdf

U.S. EPA (U. S. Environmental Protection Agency). (2018b). Table 2. Acute dose-response values for screening risk assessments. Washington, DC: U.S. Environmental Protection Agency. https://www.epa.gov/sites/production/files/2014-05/documents/table2.pdf

U.S. EPA (U.S. Environmental Protection Agency). (2018c). ECOTOX Knowledgebase. Washington, DC: U.S. Environmental Protection Agency. https://cfpub.epa.gov/ecotox/

U.S. EPA (U.S. Environmental Protection Agency). (2018d). Great Lakes Environmental Database (GLENDA) [Database]. Retrieved from https://www.epa.gov/great-lakes-monitoring/great-lakes-fish-monitoring-surveillance-program-data

U.S. EPA (U.S. Environmental Protection Agency). (2019a). Chemical and Products Database (CPDat). https://www.epa.gov/chemical-research/cheTSCAmical-and-products-database-cpdat

U.S. EPA (U.S. Environmental Protection Agency). (2019b). Chemical Data Reporting (CDR) Database [Website]. Washington, DC: U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. https://www.epa.gov/chemicals-under-tsca

U.S. EPA (U.S. Environmental Protection Agency). (2019c). Chemical Data Reporting (2012 and 2016 CBI CDR database). Washington, DC. U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. Retrieved: April 25, 2019.

U.S. EPA (U.S. Environmental Protection Agency). (2019d). Envirofacts Toxics Release Inventory 2017 Updated Dataset (released April 2019) https://www.epa.gov/enviro/tri-customized-search

USGS (U.S. Geological Survey). (1991a). USGS Monitoring Data: National Water Quality Monitoring Council [Database]. Retrieved from https://www.waterqualitydata.us/portal

USGS (U.S. Geological Survey). (1991b). USGS Monitoring Data: National Water Quality Monitoring Council - Air [Database]. Retrieved from https://www.waterqualitydata.us/portal/#sampleMedia=Air&mimeType=csv

USGS (U.S. Geological Survey). (1991c). USGS Monitoring Data: National Water Quality Monitoring Council - Groundwater [Database]. Retrieved from https://www.waterqualitydata.us/portal/#siteType=Aggregate%20groundwater%20use&sampleMedia=Water&mimeType=csv&dataProfile=activityAll

USGS (U.S. Geological Survey). (1991d). USGS Monitoring Data: National Water Quality Monitoring Council - Sediment [Database]. Retrieved from https://www.waterqualitydata.us/portal/#sampleMedia=Sediment&mimeType=csv

USGS (U.S. Geological Survey). (1991e). USGS Monitoring Data: National Water Quality Monitoring Council - Soil [Database]. Retrieved from https://www.waterqualitydata.us/portal/#sampleMedia=Soil&mimeType=csv

USGS (U.S. Geological Survey). (1991f). USGS Monitoring Data: National Water Quality Monitoring Council - Surface Water [Database]. Retrieved from https://www.waterqualitydata.us/portal/#siteType=Aggregate%20surface-water-use&sampleMedia=Water&mimeType=csv

USGS (U.S. Geological Survey). (1991g). USGS Monitoring Data: National Water Quality Monitoring Council - Tissue [Database]. Retrieved from https://www.waterqualitydata.us/portal/#sampleMedia=Tissue&mimeType=csv

Walbridge, CT; Fiandt, JT; Phipps, GL; Holcombe, GW. (1983). Acute toxicity of ten chlorinated aliphatic hydrocarbons to the fathead minnow (Pimephales promelas). Archives of Environmental Contamination and Toxicology 12: 661-666.

Witt, KL; Knapton, A; Wehr, CM; Hook, GJ; Mirsalis, J; Shelby, MD; MacGregor, JT. (2000). Micronucleated erythrocyte frequency in peripheral blood of B6C3F(1) mice from short-term, prechronic, and chronic studies of the NTP carcinogenesis bioassay program. Environmental and Molecular Mutagenesis 36: 163-194. http://dx.doi.org/10.1002/1098-2280(2000)36:3<163::AID-EM1>3.0.CO;2-P

Wood, PR; Lang, RF; Payan, IL. (1985). Anaerobic transformation, transport, and removal of volatile chlorinated organics in ground water. In Ground water quality. New York, NY: John Wiley and Sons.

Wu, S; Zhang, H; Yu, X; Qiu, L. (2014). Toxicological responses of Chlorella vulgaris to dichloromethane and dichloroethane. Environmental Engineering Science 31: 9-17. http://dx.doi.org/10.1089/ees.2013.0038