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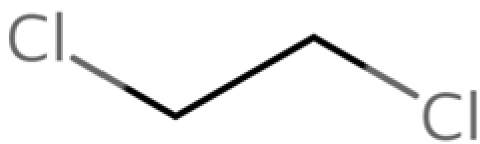
Pollution Prevention

United States
Environmental Protection Agency

# General Population Exposure Assessment for 1,2-Dichloroethane

## Technical Support Document for the Risk Evaluation

## CASRN 107-06-2




*April 2026*

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# KEY ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| 30Q5 | Lowest 30-day average flow that occurs (on average) once every 5 years |
| 7Q10 | Lowest 7-day average flow that occurs (on average) once every 10 years |
| AC | Acute concentration |
| ADC | Average daily concentrations |
| ADD | Average daily dose |
| ADR | Acute dose rate |
| AERMOD | American Meteorological Society/Environmental Protection Agency Regulatory Model |
| CASRN | Chemical Abstracts Service Registry Number |
| COU | Condition of use |
| DMR | Discharge Monitoring Report |
| DRAS | Hazardous Waste Delisting Risk Assessment Software (Model) |
| E-FAST | Exposure and Fate Assessment Screening Tool (Model) |
| EPA | Environmental Protection Agency (U.S.) |
| HEM | Human Exposure Model |
| IUR | Inhalation Unit Risk |
| LADC | Lifetime average daily concentrations |
| LADD | Lifetime average daily dose |
| MCL | Maximum Contaminant Level |
| NEI | National Emissions Inventory |
| NHDPlus2 | National hydrography dataset plus edition 2 |
| NPDES | National Pollutant Discharge Elimination System |
| NPDWR | National Primary Drinking Water Regulation |
| OCSPP | Office of Chemical Safety and Pollution Prevention (U.S.) |
| OES | Occupational exposure scenario |
| OPPT | Office of Pollution Prevention and Toxics (U.S.) |
| PESS | Potentially exposed or susceptible subpopulation |
| POTW | Publicly owned treatment works |
| SYR4 | Fourth six-year review |
| TRI | Toxics Release Inventory |
| TSCA | Toxic Substances Control Act |
| TSD | Technical support document |
| U.S. | United States |
| WWT | Wastewater treatment |

# SUMMARY

This technical support document (TSD) accompanies the Toxic Substances Control Act (TSCA) *Risk Evaluation for 1,2-Dichloroethane* (also called the "risk evaluation") (U.S. EPA, 2026k) and describes exposure to the general population from releases of 1,2-dichloroethane associated with conditions of use (COUs).

The U.S. Environmental Protection Agency (EPA or the Agency) evaluated the reasonably available information for the following general population exposures to 1,2-dichloroethane, the key points of which are summarized in the bullets below:

- Inhalation exposure is the major general population exposure pathway. EPA evaluated acute, chronic, and lifetime general population exposures to 1,2-dichloroethane in ambient air.
    - Between the draft and this final risk evaluation, EPA updated the ambient air assessment to include the most recent data available for the (1) Toxics Release Inventory (TRI) through 2024, and (2) National Emissions Inventory (NEI) through 2020. Facility-reported releases were modeled using the Human Exposure Model Version 5.0 (HEM5.0). These updates were made in response to public comments on the draft risk evaluation.
    - HEM5.0 was used to estimate exposures at a U.S. census block level and identify exposed populations up to 50 km from releasing facilities (Sections 3.2 and 3.3.2).
        - Exposures from industrial releases of 1,2-dichloroethane that can be attributed to COUs based on the HEM5.0 95th percentile annual average concentrations at 1,000 m range from 0 to 7.1 µg/m$^3$, with the highest exposure being attributed to the Manufacturing occupational exposure scenario (OES).
    - The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) was used to estimate exposures at a set of predefined receptors on a polar grid up to 10 km from generic facilities/sites with industrial activities mapped to standardized OESs where there were limited or no reported data on releases (Sections 3.3.1 and 3.2.1).
        - Exposures based on the AERMOD 95th percentile annual average modeled concentrations ranged from 0.0 to 32 µg/m$^3$ at 1,000 m from facility releases, with the highest exposure being attributed to the Industrial Application of Adhesives and Sealants OES.
- EPA evaluated exposures to 1,2-dichloroethane from ingestion of drinking water (Section 4.1.1), incidental ingestion of and dermal absorption of surface water while swimming (Sections 4.2 and 5.1), as well as fish ingestion (Section 4.4.1). Surface water concentrations were updated based on facility release data from 2021 to 2024 with the representative facility per OES across all years of 2015 to 2024, in response to public comments on the draft risk evaluation.
    - Oral exposures from ingestion of drinking water containing 1,2-dichloroethane in receiving water as source water were estimated to result in low exposures.
    - Oral and dermal exposures from swimming in receiving water containing 1,2-dichloroethane from releases were estimated to result in low exposures.
    - Oral exposures from ingestion of fish containing 1,2-dichloroethane were estimated for adults, children, and subsistence and tribal fishers. In response to public comments, EPA also included tribal children's consumption rates for ages 3 to 5 and ages 6 to 11 years.

For all scenarios, low bioaccumulation potential for 1,2-dichloroethane in fish results in low exposures.

- Oral exposures by children via incidental ingestion of 1,2-dichloroethane in soil that contains land-applied biosolids were expected to result in low exposures.

# 1 INTRODUCTION

Also known as ethylene dichloride, 1,2-dichloroethane is a volatile, synthetic hydrocarbon that is primarily used in the synthesis of vinyl chloride; over 90% is produced for conversion to vinyl chloride (EPA-HQ-OPPT-2018-0427-0040). EPA evaluated the presence of 1,2-dichloroethane in different media—air, water, and land—through reported concentrations in monitoring databases, peer-reviewed literature, and gray literature, as detailed in the *Environmental Media Concentrations Assessment for 1,2-Dichloroethane* (also called the "1,2-dichloroethane media concentrations TSD") (U.S. EPA, 2026f). The Agency evaluated the reasonably available information for releases of 1,2-dichloroethane from facilities that use, manufacture, process, or dispose of 1,2-dichloroethane under industrial and/or commercial COUs under TSCA as detailed in the *Environmental Release Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026g). EPA estimated concentrations of 1,2-dichloroethane in different media using facility-reported releases (U.S. EPA, 2026f). Based on the chemical properties and fate parameters detailed in the *Chemistry and Fate and Transport Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026c), and as further supported by monitoring data (U.S. EPA, 2026f), exposures to 1,2-dichloroethane for the general population are expected through the air, water, and land pathways.

Due to its volatility (vapor pressure of 78.9 mmHg at 25 °C), 1,2-dichloroethane will primarily remain in air when released to air, which accounts for 91% of the releases reported to the TRI. 1,2-Dichloroethane has a half-life in ambient air of 42 to 51 days and is primarily transformed by indirect photolysis through reaction with hydroxyl radicals (·OH). It will also be subject to long-range transport and potentially undergo both wet and dry deposition. When released into surface waters, 1,2-dichloroethane will remain in water due to its water solubility (8,600 mg/L); releases to wastewater treatment facilities are removed primarily through air stripping. When released to land via landfill disposal or biosolids application, 1,2-dichloroethane is expected to either volatilize or be mobile in the subsurface and migrate to groundwater due to its low affinity for soil organic matter. Industrial releases via air and wastewater are the major sources of 1,2-dichloroethane in the environment.

Facilities report 1,2-dichloroethane releases to ambient air, surface water, and landfills (U.S. EPA, 2026g). EPA used these facility-specific reported releases (*i.e.*, data from TRI, NEI, and Discharge Monitoring Reports [DMR]) to evaluate exposures of 1,2-dichloroethane to the general population. For COUs where there is limited or no reported release data, EPA estimates releases (U.S. EPA, 2026g).

Table 1-1 provides a crosswalk between COUs and OESs by life cycle stage. Table 1-2 presents the exposures assessed per OES based on the corresponding media to which 1,2-dichloroethane is released.

**Table 1-1. Crosswalk of 1,2-Dichloroethane COUs to Assessed OESs**

| COU | | | OES |
|---|---|---|---|
| **Life Cycle Stage**[a] | **Category**[b] | **Subcategory**[c] | |
| Manufacturing | Domestic manufacture | Domestic manufacture | Manufacturing[d] |
| | | | Manufacturing as an Unintended Byproduct |
| | Import | Import | Repackaging |
| Processing | Processing – As a reactant | Intermediate in: Petrochemical manufacturing; Plastic material and resin manufacturing; All other basic organic chemical manufacturing; All other basic inorganic chemical manufacturing | Processing as a Reactant |
| | Processing – Incorporated into Formulation, Mixture, or Reaction Product | Fuels and fuel additives: All other petroleum and coal products manufacturing | Processing into Formulation, Mixture, or Reaction Product |
| | | Processing aids: Specific to petroleum production | Processing into Formulation, Mixture, or Reaction Product |
| | | Adhesives and sealants; Lubricants and greases; Process regulators; Degreasing and cleaning solvents; Pesticide, fertilizer, and other agricultural chemical manufacturing | Processing into Formulation, Mixture, or Reaction Product |
| | Repackaging | Repackaging | Repackaging |
| | Recycling | Recycling | Processing as a Reactant |
| Distribution in commerce | Distribution in commerce | Distribution in commerce | Distribution in Commerce[e] |
| Industrial use | Adhesives and sealants | Adhesives and sealants | Industrial Application of Adhesives and Sealants |
| | Functional fluids (closed systems) | Heat transferring agent | Heat Transferring Agent[f] |
| | Lubricants and greases | Solid film lubricants and greases | Industrial Application of Lubricants and Greases |
| | Process regulator | *e.g.,* Catalyst moderator; Oxidation inhibitor | Processing as a Reactant |
| | Solvents (for cleaning and degreasing) | Degreasing and cleaning solvents | Commercial Aerosol Products |
| | | | Non-Aerosol Cleaning and Degreasing |
| | Other use | Process solvent | Processing into Formulation, Mixture, or Reaction Product |
| Commercial use | Plastic and rubber products | Products such as: Plastic and rubber products | Plastic and Rubber Products[f] |
| | Fuels and related | Fuels and related products | Fuels and Related |

| COU | | | OES |
|---|---|---|---|
| **Life Cycle Stage[a]** | **Category[b]** | **Subcategory[c]** | |
| | products | | Products[f] |
| | Other use | Laboratory chemical | Laboratory Use |
| Consumer use | Plastic and rubber products | Plastic and rubber products | N/A[g] |
| Disposal | Disposal | Disposal | Waste Handling, Treatment, and Disposal (Landfill) |
| | | | Waste Handling, Treatment, and Disposal (POTW) |
| | | | Waste Handling, Treatment, and Disposal (Remediation) |
| | | | Waste Handling, Treatment, and Disposal (Non-POTW WWT) |
| | | | Waste Handling, Treatment, and Disposal (Incinerator) |

COU = condition of use; OES = occupational exposure scenario; POTW = publicly owned treatment works; WWT = wastewater treatment plant

[a] Life cycle stage use definitions (40 CFR 711.3)

- "Industrial use" means use at a site at which 1 or more chemicals or mixtures are manufactured (including imported) or processed.
- "Commercial use" means the use of a chemical or a mixture containing a chemical (including as part of an article) in a commercial enterprise providing saleable goods or services.
- "Consumer use" means the use of a chemical or a mixture containing a chemical (including as part of an article, such as furniture or clothing) when sold to or made available to consumers for their use.
- Although EPA has identified both industrial and commercial uses here for purposes of distinguishing scenarios in this document, the Agency interprets the authority over "any manner or method of commercial use" under TSCA section 6(a)(5) to reach both.

[b] These categories of COUs reflect CDR codes and broadly represent COUs for 1,2-dichloroethane in industrial and/or commercial settings.

[c] These subcategories reflect more specific uses of 1,2-dichloroethane.

[d] During the manufacture of 1,2-dichloroethane, the byproducts 1,1-dichloroethane, 1,1,2-trichloroethane, *trans*-1,2-dichloroethylene, trichloroethylene, perchloroethylene, methylene chloride, and carbon tetrachloride are formed, and are assessed in the risk evaluation. See *Byproducts Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026b).

[e] EPA considers the activities of loading and unloading of chemical product part of distribution in commerce; however, these activities were assessed as part of each use's OES. EPA's current approach for quantitatively assessing releases and exposures for the remaining aspects of distribution in commerce consists of searching DOT and NRC data for incident reports pertaining to 1,2-dichloroethane distribution.

[f] Although these uses were identified during scoping, upon further investigation, EPA made the decision to not quantitatively assess the releases and exposures due to these uses of 1,2-dichloroethane. The rationale for not performing a quantitative assessment is described in Section 1.2 of both the *Environmental Release Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026g) and *Occupational Exposure Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026j).

[g] Consumer uses are not assigned to OESs but are assessed elsewhere in this risk evaluation. See also the *Consumer Exposure Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026d).

**Table 1-2. Summary of Environmental Releases of 1,2-Dichloroethane by Occupational Exposure Scenarios**

| OES | Estimated Annual Release (kg/site-yr) [a] | | Type of Discharge,[b] Air Emission,[c] or Transfer for Disposal [d] | Estimated Daily Release (kg/site-day) [e] | | Number of Facilities [f] | Source(s) |
|---|---|---|---|---|---|---|---|
| | Central Tendency [g] | High-End | | Central Tendency | High-End | | |
| Manufacturing | 1.4 | 190 | Surface water | 3.9E−03 | 0.54 | 70 | 2015−2024 TRI/DMR |
| | 3,174 | 1.7E04 | Fugitive air | 9.1 | 48 | 22 | 2015−2024 TRI |
| | 1,102 | 1.2E04 | Stack air | 3.1 | 35 | 23 | 2015−2024 TRI |
| | 2,665 | 1.0E04 | Fugitive air | 7.6 | 29 | 21 | 2014, 2017, and 2020 NEI[k] |
| | 833 | 6,192 | Stack air | 2.4 | 18 | 23 | 2014, 2017, and 2020 NEI[k] |
| | 6.8 | 621 | Land | 1.9E−02 | 1.8 | 18 | 2015−2024 TRI |
| Repackaging | 4.1E−02 | 227 | Surface water | 1.6E−04 | 0.91 | 27 | 2015−2024 TRI/DMR |
| | 113 | 227 | Fugitive air | 0.45 | 0.91 | 4 | 2015−2024 TRI |
| | 38 | 227 | Stack air | 0.15 | 0.91 | 4 | 2015−2024 TRI |
| | 1.4E−02 | 105 | Fugitive air | 5.7E−05 | 0.42 | 28 | 2014, 2017, and 2020 NEI[k] |
| | 2.0 | 545 | Stack air | 7.8E−03 | 2.2 | 11 | 2014, 2017, and 2020 NEI[k] |
| | 3.6 | 5.8 | Fugitive or stack air | 8.4E−02 | 0.15 | N/A | Environmental release modeling |
| | 275 | 320 | Hazardous waste landfill or incineration [j] | 6.5 | 10 | N/A | Environmental release modeling |
| Processing as a Reactant | 0.26 | 227 | Surface water | 7.4E−04 | 0.65 | 38 | 2015−2024 TRI/DMR |
| | 37 | 399 | Fugitive air | 0.10 | 1.1 | 11 | 2015−2024 TRI |
| | 5.4 | 445 | Stack air | 1.6E−02 | 1.3 | 10 | 2015−2024 TRI |
| | 63 | 4,216 | Fugitive air | 0.18 | 12 | 17 | 2014, 2017, and 2020 NEI[k] |
| | 14 | 1,622 | Stack air | 3.9E−02 | 4.6 | 14 | 2014, 2017, and 2020 NEI[k] |
| | 6.8 | 621 | Land | 1.9E−02 | 1.8 | 4 | 2015−2024 TRI |

| OES | Estimated Annual Release (kg/site-yr) [a] | | Type of Discharge,[b] Air Emission,[c] or Transfer for Disposal [d] | Estimated Daily Release (kg/site-day) [e] | | Number of Facilities [f] | Source(s) |
|---|---|---|---|---|---|---|---|
| | Central Tendency [g] | High-End | | Central Tendency | High-End | | |
| Processing into Formulation, Mixture, or Reaction Product | 0.50 | 18 | Surface water | 1.7E−03 | 6.1E−02 | 40 | 2015−2024 TRI/DMR |
| | 72 | 3,012 | Fugitive air | 0.24 | 10 | 11 | 2015−2024 TRI |
| | 31 | 2,167 | Stack air | 0.10 | 7.2 | 9 | 2015−2024 TRI |
| | 113 | 438 | Fugitive air | 0.38 | 1.5 | 10 | 2014, 2017, and 2020 NEI[k] |
| | 8.6 | 1,595 | Stack air | 2.9E−02 | 5.3 | 9 | 2014, 2017, and 2020 NEI[k] |
| | 227 | 1.3E04 | Land | 0.76 | 42 | 3 | 2015−2024 TRI |
| Industrial Application of Adhesives and Sealants | 1.8 | 261 | Fugitive air | 6.9E−03 | 1.0 | 39 | 2014, 2017, and 2020 NEI[k] |
| | 4.6 | 274 | Stack air | 1.8E−02 | 1.1 | 69 | 2014, 2017, and 2020 NEI[k] |
| | 4.4E03 [h] | 4.4E03 [h] | Fugitive or stack air | 59 | 162 | N/A | Environmental release modeling |
| | 155 | 174 | Hazardous landfill or incineration [j] | 2.1 | 5.8 | N/A | Environmental release modeling |
| Industrial Application of Lubricants and Greases | 7.3E−02 | 82 | Fugitive air | 2.9E−04 | 0.33 | 2 | 2014, 2017, and 2020 NEI[k] |
| | 8.8E−03 | | Stack air | 3.5E−05 | | 1 | 2014, 2017, and 2020 NEI[k] |
| Industrial and Commercial Non-Aerosol Cleaning/ Degreasing | 0.43 | 13 | Surface water | 1.7E−03 | 5.0E−02 | 4 | 2015−2024 TRI/DMR |
| | 4.1 | 1,738 | Fugitive air | 1.6E−02 | 7.0 | 1 | 2015−2024 TRI |
| | 11 | 995 | Stack air | 4.5E−02 | 4.0 | 1 | 2015−2024 TRI |
| | 2.2 | 42 | Fugitive air | 8.9E−03 | 0.17 | 13 | 2014, 2017, and 2020 NEI[k] |
| | 3.0 | 402 | Stack air | 1.2E−02 | 1.6 | 15 | 2014, 2017, and 2020 NEI[k] |
| | 0.5 | 9 | Land | 1.8E−03 | 3.8E−02 | 1 | 2015−2024 TRI |

| OES | Estimated Annual Release (kg/site-yr) [a] | | Type of Discharge,[b] Air Emission,[c] or Transfer for Disposal [d] | Estimated Daily Release (kg/site-day) [e] | | Number of Facilities [f] | Source(s) |
|---|---|---|---|---|---|---|---|
| | Central Tendency [g] | High-End | | Central Tendency | High-End | | |
| Industrial and Commercial Non-Aerosol Cleaning/ Degreasing (*Continued*) | 1.3E04 | 4.2E04 | Fugitive or stack air | 42 | 141 | N/A | Environmental release modeling |
| | 662 | 2,606 | Wastewater treatment | 2.2 | 8.8 | N/A | Environmental release modeling |
| | 7,152 | 3.1E04 | Hazardous waste incineration | 24 | 103 | N/A | Environmental release modeling |
| | 64 | 255 | Hazardous waste landfill [j] | 0.24 | 0.86 | N/A | Environmental release modeling |
| Commercial Aerosol Products | 379 | 382 | Fugitive air | 1.5 | 1.5 | N/A | Environmental release modeling |
| Laboratory Use | 1.1E−02 | 0.38 | Surface water | 4.1E−05 | 1.4E−03 | 4 | 2015−2024 TRI/DMR |
| | 1.3 | 10 | Fugitive air | 5.2E−03 | 3.8E−02 | 6 | 2014, 2017, and 2020 NEI[k] |
| | 126 | 233 | Stack air | 0.48 | 0.90 | 2 | 2014, 2017, and 2020 NEI[k] |
| | 1.4 | 12 | Fugitive or stack air | 6.2E−03 | 5.0E−02 | N/A | Environmental release modeling |
| | 15 | 812 | Hazardous landfill or incineration [j] | 6.5E−02 | 3.5 | N/A | Environmental release modeling |
| Waste Handling, Treatment, and Disposal (Incinerator) | 5.8E−03 | 116 | Surface water | 2.3E−05 | 0.46 | 7 | 2015−2024 TRI/DMR |
| | 1.2 | 310 | Fugitive air | 4.7E−03 | 1.2 | 20 | 2015−2024 TRI |
| | 0.48 | 263 | Stack air | 1.9E−03 | 1.1 | 22 | 2015−2024 TRI |
| | 0.49 | 97 | Fugitive air | 2.0E−03 | 0.39 | 26 | 2014, 2017, and 2020 NEI[k] |
| | 3.0E−02 | 39 | Stack air | 1.2E−04 | 0.16 | 61 | 2014, 2017, and 2020 NEI[k] |
| | 6.4 | 2.3E04 | Land | 2.5E−02 | 91 | 9 | 2015−2024 TRI |

| OES | Estimated Annual Release (kg/site-yr) [a] | | Type of Discharge,[b] Air Emission,[c] or Transfer for Disposal [d] | Estimated Daily Release (kg/site-day) [e] | | Number of Facilities [f] | Source(s) |
|---|---|---|---|---|---|---|---|
| | Central Tendency [g] | High-End | | Central Tendency | High-End | | |
| Waste Handling, Treatment, and Disposal (Landfill) | 5.0E−02 | 11 | Surface water | 2.0E−04 | 4.5E−02 | 8 | 2015−2024 TRI/DMR |
| | 5.1 | 33 | Fugitive air | 2.1E−02 | 0.13 | 665 | 2014, 2017, and 2020 NEI[k] |
| | 0.41 | 22 | Stack air | 1.6E−03 | 8.9E−02 | 145 | 2014, 2017, and 2020 NEI[k] |
| Waste Handling, Treatment and Disposal (Non-POTW WWT) | 1.2 | 272 | Surface water | 4.7E−03 | 1.1 | 8 | 2015−2024 TRI/DMR |
| | 7.7 | 329 | Fugitive air | 3.1E−02 | 1.3 | 12 | 2014, 2017, and 2020 NEI[k] |
| | 1.1 | 186 | Stack air | 4.4E−03 | 0.74 | 9 | 2014, 2017, and 2020 NEI[k] |
| Waste Handling, Treatment, and Disposal (POTW) | 1.9 | 134 | Surface water | 5.1E−03 | 0.37 | 122 | 2015−2024 DMR |
| | 7.0 | 128 | Fugitive air | 2.8E−02 | 0.51 | 29 | 2014, 2017, and 2020 NEI[k] |
| | 15 | 37 | Stack air | 6.0E−02 | 0.15 | 3 | 2014, 2017, and 2020 NEI[k] |
| Waste Handling, Treatment, and Disposal (remediation) | 4.3E−02 | 2.0 | Surface water | 1.2E−04 | 5.5E−03 | 29 | 2015−2024 TRI/DMR |
| | 1.8 | 29 | Fugitive air | 4.8E−03 | 8.0E−02 | 30 | 2014, 2017, and 2020 NEI[k] |
| | 18 | 1,369 | Stack air | 4.8E−02 | 3.8 | 5 | 2014, 2017, and 2020 NEI[k] |
| Facilities not mapped to an OES | N/A | | | | | 617 [i] | – |

DMR = Discharge Monitoring Report; NEI = National Emissions Inventory; OES = occupational exposure scenario; POTW = publicly owned treatment works; TRI = Toxics Release Inventory; WWT = wastewater treatment

[a] For modeled results, the presented central tendency and high-end are the 50th and 95th percentile values of the modeled distribution. For programmatic data, the presented central tendency is calculated from the median reported release amounts and high-end from the reported maximum release amounts. The specific central tendency and high-end values presented depends on the number of sites with programmatic data. For databases with 6+ reporting facilities, EPA estimated central tendency and high-end releases using the 50th and 95th percentile values, respectively. For 3–5 facilities, EPA estimated the central tendency and high-end releases using the 50th percentile and maximum values, respectively. For 2 sites, EPA presented the midpoint and the maximum value. Finally, EPA presented sites with only 1 data point as-is from the programmatic database.

[b] Direct discharge to surface water; indirect discharge to non-POTW WWT; indirect discharge to POTW

| OES | Estimated Annual Release (kg/site-yr) [a] | | Type of Discharge,[b] Air Emission,[c] or Transfer for Disposal [d] | Estimated Daily Release (kg/site-day) [e] | | Number of Facilities [f] | Source(s) |
|---|---|---|---|---|---|---|---|
| | Central Tendency [g] | High-End | | Central Tendency | High-End | | |

[c] Emissions via fugitive air; stack air; or treatment via incineration
[d] Transfer to surface impoundment, land application, or landfills
[e] Where available, EPA used peer-reviewed literature (*e.g.,* GSs or ESDs) to provide a basis to estimate the number of release days of 1,2-dichloroethane within a COU.
[f] Where available, EPA used the 2020 CDR (U.S. EPA, 2020a), NEI (U.S. EPA, 2025c), DMR (U.S. EPA, 2025a), and TRI databases (U.S. EPA, 2025f), 2020 U.S. County Business Practices (U.S. Census Bureau, 2022), and Monte Carlo models to estimate the number of sites that use 1,2-dichloroethane for each COU. Some modeled OES calculated the number of facilities/sites, presented as 50th and 95th percentiles. Other modeled OESs set the number of facilities deterministically, presented as 1 value.
[g] The central tendency values for NEI air were calculated using the median of the reported releases at each site.
[h] These central tendency and high-end releases appear equivalent in the table due to rounding.
[i] There were 617 facilities not mapped to an OES with 1,2-dichloroethane releases that EPA was unable to map due to the lack of information regarding the activity of 1,2-dichloroethane at the site. These sites do not fit in any of the 1,2-dichloroethane OES since they are mainly hotels, businesses, and various chemical facilities where 1,2-dichloroethane use is unknown.
[j] 1,2-dichloroethane is a U-listed hazardous waste under code U0777 under RCRA; therefore, discarded, unused pure and commercial grades of 1,2-dichloroethane are regulated as a hazardous waste under RCRA (40 CFR 261.33(f)). Hazardous waste landfill or incineration are grouped together due to uncertainty in modeled release to environmental media.
[k] Between draft and final risk evaluation, EPA incorporated 2020 NEI release data. In the general population inhalation exposure assessment (U.S. EPA, 2026i), EPA modeled and mapped only the NEI releases selected for the air assessment (not all reported NEI releases). As a result, some 2020 NEI releases for this OES may not appear in the table. See the supplemental file (U.S. EPA, 2026a) for details on NEI sites that were not mapped.

# 2 APPROACH AND METHODOLOGY OVERVIEW

General population exposures occur when 1,2-dichloroethane is released into the environment and contaminated media become pathways for exposure. EPA has evidence that 1,2-dichloroethane is present in ambient air, surface waters, and soil (U.S. EPA, 2026f), and that it is a source of potential exposure to the general population. Therefore, the Agency is quantitatively assessing exposures to the general population via the air, water, and land pathways. As described below, EPA modeled exposures for all facilities releasing to ambient air, including releases that are not mapped to an OES ("Unknown" OES). For surface water, EPA estimated surface water concentrations from all facilities and then conducted an initial screening assessment of the exposures associated with the highest surface water concentration for each COU/OES. Table 2-1 lists the evaluated environmental media pathways for each COU/OES and the corresponding sections where the general population exposure analyses for each pathway are described.

Ambient air concentrations were modeled based on either facility-specific using HEM5.0 or EPA-estimated releases from generic facilities/sites using AERMOD, as detailed in the 1,2-dichloroethane media concentrations TSD (U.S. EPA, 2026f). AERMOD-modeled ambient air concentrations were then used to estimate inhalation exposures to the general population at distances up to 10 km from releasing facilities. HEM5.0 (Sections 3.2 and 3.3.2) was used to estimate exposures at a U.S. census block level and identify exposed populations up to 50 km from releasing facilities. HEM5.0 also provides data that characterizes the exposed population. Modeled exposures from AERMOD and HEM5.0 were then used to calculate acute, chronic non-cancer, and cancer risks via the ambient air pathway, as outlined in the 1,2-dichloroethane risk evaluation (U.S. EPA, 2026k).

The Agency used facility-reported and EPA-estimated releases of 1,2-dichloroethane to surface water together with flow metrics of the receiving water body to estimate the concentration water body at the point of release. For facility-specific surface water estimates, the flow metrics were based on the facility's National Pollutant Discharge Elimination System (NPDES) permit-defined receiving water bodies and the corresponding stream flow metrics from the National Hydrography Dataset Plus Edition 2 (NHDPlus2) (U.S. EPA and U.S.G.S., 2016) suite of geospatial datasets. EPA's low flow calculations were based on the NHDPlus2 stream flow metrics as opposed to the database within the Exposure and Fate Assessment Screening Tool (E-FAST) Model (U.S. EPA, 2014). The 1,2-dichloroethane media concentrations TSD details the 1,2-dichloroethane surface water calculations for each of the low flow metrics (U.S. EPA, 2026f). This General Population Exposure TSD used a screening approach for general population exposures from 1,2-dichloroethane in surface water. Accordingly, EPA used the highest surface water concentration per COU from the corresponding facility releases to represent the (1) high-end 1,2-dichloroethane oral drinking water exposures (Section 4.1), (2) oral fish ingestion exposures (Section 4.4), and (3) incidental oral (Section 4.2) and dermal exposures from swimming (Section 5) for the general population.

EPA's Hazardous Waste Delisting Risk Assessment Software (DRAS) Model (U.S. EPA, 2020b) was used to estimate groundwater concentrations (Section 4.3) resulting from 1,2-dichloroethane land disposal and to screen for levels in drinking water that could be a human health hazard concern. Soil concentrations were calculated using modeled air deposition rates from AERMOD to estimate oral exposures to children who play in dirt/mud and engage in other activities with soil (Section 4.3).

**Table 2-1. Exposure Scenarios Assessed**

| COU/ OES | Exposure Route | Media/ Exposure Pathway | Exposure Scenario | Populations/ Life Stage (Age) [a] | Analysis (Quantitative or Qualitative) and TSD Section |
|---|---|---|---|---|---|
| All | Inhalation | Ambient air | Inhalation exposure to 1,2-dichloroethane in ambient air from all reported and modeled releases | All | Quantitative, Section 3 |
| All | Oral | Drinking water | Ingestion of 1,2-dichloroethane in drinking water from releases to surface receiving waters | All | Quantitative, Section 4.1 |
| All | Oral | Surface water | Dermal exposure to 1,2-dichloroethane while swimming in surface water impacted by facility-specific releases | Adults and children (6+ years) | Quantitative, Section 4.2 |
| | Dermal | | Incidental ingestion of 1,2-dichloroethane while swimming in surface water impacted by facility-specific releases | Adults and children (6+ years) | Quantitative, Section 5 |
| All | Oral | Fish ingestion | Ingestion of fish exposed to 1,2-dichloroethane in receiving water for general population | Adults and young toddlers (1 to 2 years old) | Quantitative, Section 4.4 |
| | Oral | | Ingestion of fish by subsistence fishers | Adults (16 to <70 years) | Quantitative, Section 4.4 |
| | Oral | | Ingestion of fish by tribal populations | Adults (16 to <70 years) | Quantitative, Section 4.4 |
| All | Oral | Biosolids | Incidental ingestion of 1,2-dichloroethane in soils amended with land-applied biosolids | Children (3–6 years) | Qualitative, Section 4.3 |
| All | Oral | Air deposition | Incidental ingestion of 1,2-dichloroethane in soils impacted by deposition from air onto soils | Children (3–6 years) | Qualitative, Section 4.3 |

COU = condition of use; OES = occupational exposure scenario; TSD = technical support document
[a] Inhalation exposures are based on 1,2-dichloroethane ambient air concentrations at radial distances from the point of release. EPA compared these to the hazard value that was also expressed as chemical concentration in air but did not estimate inhalation by dose or by life stage.

# 3 AMBIENT AIR INHALATION EXPOSURE ASSESSMENT

For the ambient air inhalation exposure assessment, EPA first modeled 1,2-dichloroethane concentrations at various distances from releasing facilities (U.S. EPA, 2026f). For modeling of ambient air concentrations, OESs fell into one of the following three categories:

1. OESs for which there were only facility-reported releases (Manufacturing; Processing as a Reactant; Processing into Formulation, Mixture, or Reaction Product; Industrial Application of Lubricants and Greases; and Waste Handling, Treatment, and Disposal (Incinerator); Waste Handling, Treatment, and Disposal (Landfill); Waste Handling, Treatment, and Disposal (Non-POTW WWT); Waste Handling, Treatment, and Disposal (POTW); Waste Handling, Treatment, and Disposal (Remediation); and Facilities not mapped to an OES);
2. OES for which there were only modeled releases from generic facilities/sites (Commercial Aerosol Products); and
3. OESs for which there were both modeled releases from generic facilities/sites and reported releases (Industrial Application of Adhesives and Sealants; Non-Aerosol Cleaning and Degreasing; and Laboratory Use).

Based on the ambient air exposure analysis performed for the *Risk Evaluation for 1,1-Dichloroethane* (U.S. EPA, 2025d), EPA did not perform a tiering analysis for 1,2-dichloroethane. For 1,1-dichloroethane, the tiering analysis performed resulted in EPA using the most refined approach available at the time because cancer risk estimates above $1{\times}10^{-6}$ were found in the lower-tier analyses. Because 1,1- and 1,2-dichloroethane use the same Inhalation Unit Risk (IUR) and reported releases of 1,2-dichloroethane to ambient air are higher than those of 1,1-dichloroethane, EPA only performed the highest-tier of exposure analysis available. For this analysis, EPA estimated ambient air concentrations of 1,2-dichloroethane to calculate the resulting exposures and risks to the general population using two models: (1) AERMOD as a stand-alone model; and (2) HEM5.0, which conducts dispersion modeling using AERMOD as a compiled executable program. HEM5.0 was used for facility reported releases. AERMOD as a standalone program was only used when EPA estimated releases from generic facilities/sites where there were not actual facility locations that could be used in a population analysis.

## 3.1 AERMOD Modeling Approach for EPA Estimated Releases from Generic Facilities/Sites

AERMOD was used to model ambient air concentrations at eight discrete distances and two area distances (see *Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f) for a description of area distances) ranging from 10 m to 10 km only for EPA estimated releases from generic facilities/sites. For all AERMOD modeling, 10th, 50th, and 95th percentile daily and annual average ambient air concentrations were calculated for each facility. This section presents the maximum exposures within each OES based on the 95th percentile ambient air concentrations. For more information on AERMOD methods and exposure calculations, see *Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f) and *Supplemental Information on AERMOD Generic Releases Exposure and Risk Analysis for 1,2-Dichloroethane* (U.S. EPA, 2026l).

### 3.1.1 Exposure Estimates for EPA Estimated Releases from Generic Facilities/Sites

For EPA estimated releases from generic facilities/sites, acute and chronic inhalation exposures were estimated based on AERMOD-modeled ambient air concentrations detailed in the 1,2-dichloroethane media concentrations TSD (U.S. EPA, 2026f). Acute and chronic inhalation exposures used to evaluate non-cancer risks are estimated as an acute concentration (AC) or average daily concentration (ADC), respectively. Lifetime exposures used to evaluate cancer risks are estimated as a lifetime average daily concentration (LADC). Equations used to calculate each of the exposure values are provided below.

**Equation 3-1.**

$$AC = \frac{DAC \times ET}{AT}$$

**Equation 3-2.**

$$ADC = \frac{AAC \times ET \times EF \times ED}{AT}$$

**Equation 3-3.**

$$LADC = \frac{AAC \times ET \times EF \times ED}{AT}$$

Where:

| | | |
|---|---|---|
| $AC$ | = | Acute concentration (µg/m$^3$) |
| $LADC$ | = | Lifetime average daily concentration (µg/m$^3$) |
| $DAC$ | = | Daily average air concentration, model output reflecting average concentrations over a 24-hour period (µg/m$^3$) |
| $ET$ | = | Exposure time (24 hours/day) |
| $AAC$ | = | Annual average air concentration, model output reflecting average concentrations over a year (µg/m$^3$) |
| $EF$ | = | Exposure frequency (365 days/year) |
| $ED$ | = | Exposure duration (1 year for non-cancer ADC; 78 years for cancer LADC) |
| $AT$ | = | Averaging time (24 hours for AC; 24 hours/day × 365 days/year × 1 year for ADC 24 hours/day × 365 days/year × 78 years for LADC) |

For the AERMOD modeling, all exposure assumes continuous exposure (24 hours/day) throughout the duration of exposure. The exposure duration used to calculate the LADC is based on the 95th percentile of the expected duration at a single residence, 78 years, and the averaging time is based on a 78-year lifetime. The 78-year lifespan is the average life expectancy of the general population (U.S. EPA, 2011). An exposure duration of 78 years was assumed to be protective of potentially exposed or susceptible subpopulation (PESS) groups and communities that are located near releasing facilities. It is also consistent with previous recommendations from the independent Science Advisory Committee on Chemicals (SACC; accessed August 13, 2025) (U.S. EPA, 2023).

## 3.2 HEM5.0 Modeling Approach

HEM5.0 has two components: (1) an atmospheric dispersion model, AERMOD,[1] with included meteorological data; and (2) U.S. Census Bureau population data at the block level. The HEM5.0 version uses 2020 Census data—including all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.[2] AERMOD estimates the magnitude and distribution of chemical concentrations in ambient air and deposition in the vicinity of each releasing facility within user-defined radial distances out to 50 km. HEM5.0 also provides chemical concentrations in ambient air and deposition at the centroid of over 8 million census blocks across the United States. The model can combine the estimated chemical concentrations with dose-response data to estimate cancer risks and non-cancer hazards, and use population data to inform cancer incidence and other risk measures. HEM5.0 automatically uses meteorological data for each release point, as well as local topographic information, to inform the

[1] Website for AERMOD: https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermod (accessed April 22, 2026).

[2] The HEM census file for the U.S. Virgin Islands has 0 people in each location. Block-level population data may not be currently available from the 2020 census.

release dispersion model. Refer to the HEM5.0 User Guide[3] for more details about these and other capabilities. A full description of the HEM method is described in Section 3.2 (see also the HEM 4.2 User Guide[4] for more details (SC&A Incorporated, 2023)). A full description of the model settings used in the assessment is provided in the *Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f).

For HEM5.0 modeling, EPA considered TRI release data from the years 2015 to 2024 for this analysis. For each facility, EPA used the highest total emissions across those years as inputs to HEM5.0. Total emissions are the sum of the reported fugitive and stack emissions at each facility. TRI reporters may use Form R or a Form A. To use Form A, TRI reporters must release less than 500 lb/year, and facilities do not need to report release quantities or uses/sub-uses on Form A. Due to uncertainties in the actual amount released by Form A reporting facilities, EPA included only TRI reporting Form R submissions in this analysis.

For NEI data, EPA used data reported 2014, 2017, and 2020 in this analysis. In the draft risk evaluation, EPA modeled all available data for 2014 and 2017 using AERMOD (U.S. EPA, 2025b). For this assessment, EPA modeled, in HEM5.0, each facility that showed a risk greater than $1\times10^{-6}$ based on the 95th percentile concentration at 10 m from the release location based on the analysis performed in the draft risk evaluation. EPA also modeled any releases that were new to the 2020 NEI if they exceeded the lowest release from 2014 and 2017 that resulted in a risk greater than $1\times10^{-6}$ based on the 95th percentile concentration at 10 m from the release location. If a facility reported in multiple years and had total releases greater than the threshold described above, then EPA used the maximum release across all years in this analysis. The Agency did not model releases that were assigned to the OES of Use in Fuels and Related Products or if the Source Classification Codes (SCC) level one code was "internal combustion engine" or "external combustion engine", even if they met the previously stated criteria, as they were considered to be part of the OES of Fuels and Related Products, which was not quantitively evaluated in this evaluation (U.S. EPA, 2026g). 1,2-Dichloroethane was used as a lead scavenger, preventing the buildup of lead deposits within internal combustion engines, in antiknock formulations for automobiles (UNEP, 1988). While the Clean Air Act (CAA) banned the sale of leaded fuel for onroad use beginning January 1, 1996, it was still permitted in specialty uses such as in high performance racing cars. However, this use was discontinued as of 2016, with the industry shifting to use ethylene dibromide (EPA-HQ-OPPT-2018-0427-0043; EPA-HQ-OPPT-2018-0427-0006) (U.S. EPA, 2026g).

### 3.2.1 Inhalation Exposure Estimates for Fenceline Communities from HEM5.0

Exposures are calculated as part of the HEM5.0 output; therefore, EPA did not need to calculate exposures externally to HEM5.0. The overall method used in HEM5.0 for calculating exposures aggregates exposures across all releasing facilities; however, exposures at radial distances are not aggregated and are shown on a per facility basis in this assessment Additionally, when modeling exposures using HEM5.0, EPA used the default chronic exposure scenario, which assumes that an individual breathes the ambient air at a given receptor site 24 hours per day over a 70-year lifetime (SC&A Incorporated, 2023).

## 3.3 Summary of Ambient Air Exposure

EPA evaluated acute, chronic, and lifetime inhalation exposures of 1,2-dichloroethane in ambient air from industrial and commercial fugitive and stack emissions to the general population. For the ambient

[3] See the HEM 5.0 User Guide (accessed April 22, 2026).
[4] See the HEM 4.2 User Guide (accessed July 1, 2025).

air exposure, the analysis focuses on general population exposures that might occur within 10 km of releasing facilities for releases modeled using AERMOD (facilities that rely on EPA-estimated releases from generic facilities/site) and 50 km for releases modeled using HEM (facility-reported releases reported in NEI and TRI). HEM5.0 exported 95th percentile daily concentration and annual exposure concentrations (equivalent to a LADC) at each modeled receptor for each release up to 50 km from releasing facilities with reported releases. Presented in this section are the maximum annual average concentrations for each OES based on the 95th percentile modeled ambient air concentration at a given distance.

For exposure estimates based on EPA estimated releases from generic facilities/sites, EPA calculated 10th, 50th, and 95th percentile ACs, ADCs, and LADCs at each radial distance for each release up to 10 km from the release point. Presented in this section are the maximum LADCs for each OES based on the 95th percentile AERMOD modeled ambient air concentration.

For more information on exposure calculations see the *Supplemental Information on HEM Exposure and Risk Analysis for 1,2-Dichloroethane* (U.S. EPA, 2026n), *Supplemental Information on AERMOD Generic Releases Exposure and Risk Analysis for 1,2-Dichloroethane* (U.S. EPA, 2026l), and *Supplemental Information on HEM NEI Exposure and Risk Analysis* (U.S. EPA, 2026m).

### 3.3.1 Ambient Air Exposure Using HEM5.0 Modeled Concentrations

For each facility reporting to TRI and NEI, an LADC was estimated based on the 95th percentile exposure at each modeled distance. The highest LADCs at each distance for each OES based on TRI and NEI reported releases are presented in Table 3-1 and Table 3-2, respectively.

Overall, for TRI reporting facilities, the Manufacturing OES had the highest estimated exposures with a maximum 95th modeled exposure of 2,639 μg/m$^3$ occurring at 10 m from the modeled facility release location; however, a distance of 10 m is likely not representative of a general population exposure and an exposure 7.1 μg/m$^3$ at a distance of 1,000 m is more representative of general population exposure. Across all OESs higher exposures occur at distances nearer to the release location and decrease as the distance increases. Note that this concentration represents a single release and is not an aggregated exposure. Aggregated risk estimates at census block centroids are presented in the risk evaluation (U.S. EPA, 2026k).

Overall, for NEI reporting facilities, the Manufacturing OES had the highest estimated exposures 10 m from the modeled facility release location, but an exposure of 5.5 μg/m$^3$ at a distance of 1,000 m is more representative of general population, which is similar to what was estimated when using TRI releases. Note that this concentration represents a single release and is not an aggregated exposure. Aggregated risk estimates at census block centroids are presented in the risk evaluation (U.S. EPA, 2026k).

Table 3-3 provides a summary of the LADCs for the OESs where EPA estimated releases were used as inputs to AERMOD. The lifetime exposure estimates presented in this section are based on high-end meteorology (Lake Charles, Louisiana) and both rural and urban topography. Across all OESs and at distances at or exceeding to 1,000 m, estimated lifetime exposures range from $1.6\times10^{-4}$ to 36 μg/m$^3$.

The complete set of inhalation exposure estimates is presented in the *Supplemental Information on HEM TRI Exposure and Risk Analysis for 1,2-Dichloroethane* (U.S. EPA, 2026n), *Supplemental Information on HEM NEI Exposure and Risk Analysis* (U.S. EPA, 2026l), and *Supplemental Information on HEM Generic Releases Exposure and Risk Analysis* (U.S. EPA, 2026l).

**Table 3-1. Maximum 95th Percentile Lifetime Average Daily Ambient Air Concentrations for 1,2-Dichloroethane Releases Reported to TRI from 2015–2024 Modeled Using HEM5.0[a b]**

| OES | Number of Facilities Evaluated in OES | Statistic[c] | 95th Percentile Lifetime Average Daily Ambient Air Concentration (µg/m$^3$) Estimated at Distances from 10–50,000 m from Releasing Facilities | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 10 m | 30 m | 60 m | 100 m | 1,000 m | 2,500 m | 5,000 m | 10,000 m | 15,000 m | 10,000 m | 50,000 m |
| Manufacturing | 24 | Max | 2,640 | 2,340 | 787 | 341 | 7.1 | 1.6 | 0.50 | 0.17 | 9.0E−02 | 3.8E−02 | 1.4E−02 |
| Repackaging | 4 | Max | 9.4 | 3.4 | 1.2 | 0.62 | 2.0E−02 | 5.5E−03 | 2.0E−03 | 7.4E−04 | 4.0E−04 | 1.9E−04 | 6.4E−05 |
| Processing as a Reactant | 13 | Max | 42 | 15 | 6.0 | 2.8 | 7.0E−02 | 1.6E−02 | 5.6E−03 | 2.0E−03 | 1.2E−03 | 5.7E−04 | 2.2E−04 |
| Processing into Formulation, Mixture, or Reaction Product | 11 | Max | 1,140 | 265 | 87 | 37 | 0.61 | 0.13 | 4.1E−02 | 1.6E−02 | 9.5E−03 | 5.0E−03 | 2.2E−03 |
| Non-Aerosol Cleaning and Degreasing | 1 | Max | 9.7E−03 | 5.54E−03 | 6.8E−03 | 9.7E−03 | 1.3E−03 | 4.1E−04 | 1.8E−04 | 6.4E−05 | 3.4E−05 | 1.6E−05 | 5.1E−06 |
| Waste Handling, Treatment, and Disposal (Incinerator) | 23 | Max | 61 | 21 | 9.5 | 4.7 | 0.12 | 2.6E−02 | 8.6E−03 | 2.8E−03 | 1.5E−03 | 6.4E−04 | 2.2E−04 |

HEM5.0 = Human Exposure Model Version 5; OES = occupational exposure scenario; TRI = Toxics Release Inventory
[a] The full inputs and results are presented in the *Supplemental Information on HEM TRI Exposure and Risk Analysis for 1,2-Dichloroethane* (U.S. EPA, 2026n).
[b] For each OES, EPA modeled the highest total (fugitive + stack) annual Toxic Release Inventory-reported release for each facility from 2015–2024.
[c] At each distance there are 16 receptors that form a circle around the release location. HEM5.0 calculates an annual average at each point, giving 16 averages. The 95th percentile was calculated for these 16 averages for each release location and distance separately. The maximum (max) values in this table are the highest of the 95th percentile annual average concentrations for each OES.

**Table 3-2. Maximum 95th Percentile Lifetime Average Daily Ambient Air Concentrations for 1,2-Dichloroethane Releases Reported to NEI for the Reporting Years of 2014, 2017, and 2020 Modeled Using HEM5.0[a b c]**

| OES | Number of Releases Evaluated in OES[c] | Statistic[d] | 95th Percentile Lifetime Average Daily Concentrations (µg/m³) Estimated at Distances from 10–50,000 m from Release Locations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 10 m | 30 m | 60 m | 100 m | 1,000 m | 2,500 m | 5,000 m | 10,000 m | 15,000 m | 10,000 m | 50,000 m |
| Manufacturing | 399 | Max | 1,830 | 2,380 | 721 | 303 | 5.5 | 1.2 | 0.36 | 0.12 | 6.1E−02 | 2.7E−02 | 9.5E−03 |
| Repackaging | 13 | Max | 1.0 | 2.4 | 3.4 | 1.1 | 0.95 | 2.8E−02 | 1.0E−02 | 3.6E−03 | 2.0E−03 | 9.4E−04 | 3.4E−04 |
| Processing as a Reactant | 133 | Max | 180 | 67 | 24 | 24 | 0.44 | 0.25 | 3.2E−02 | 9.4E−03 | 5.0E−03 | 2.3E−03 | 7.5E−04 |
| Processing into Formulation, Mixture, or Reaction Product | 51 | Max | 277 | 188 | 80 | 42 | 1.2 | 0.28 | 8.9E−02 | 2.9E−02 | 1.5E−02 | 6.7E−03 | 2.2E−03 |
| Industrial Application of Adhesives and Sealants | 104 | Max | 3.4 | 1.2 | 0.79 | 0.47 | 3.0E−02 | 1.3E−02 | 6.1E−03 | 2.4E−03 | 1.2E−03 | 5.4E−04 | 2.0E−04 |
| Industrial Application of Lubricants and Greases | 1 | Max | 2.6 | 2.4 | 0.95 | 0.40 | 7.4E−03 | 1.3E−03 | 4.6E−04 | 1.7E−04 | 8.4E−05 | 3.5E−05 | 1.4E−05 |
| Non-Aerosol Cleaning and Degreasing | 27 | Max | 24 | 6.3 | 2.7 | 1.4 | 3.4E−02 | 1.4E−02 | 5.6E−03 | 2.1E−03 | 1.2E−03 | 5.5E−04 | 1.7E−04 |
| Laboratory Use | 4 | Max | 1.1 | 0.37 | 0.12 | 4.7E−02 | 9.6E−03 | 3.9E−03 | 1.6E−03 | 6.3E−04 | 3.4E−04 | 1.7E−04 | 5.8E−05 |
| Waste Handling, Treatment, and Disposal (Incinerator) | 21 | Max | 12 | 7.9 | 2.5 | 1.1 | 2.0E−02 | 4.3E−03 | 1.3E−03 | 5.6E−04 | 3.0E−04 | 1.4E−04 | 5.1E−05 |
| Waste Handling, Treatment, and Disposal (Landfill) | 563 | Max | 110 | 8.5 | 3.5 | 1.8 | 3.6E−02 | 9.2E−03 | 2.9E−03 | 1.0E−03 | 5.3E−04 | 2.3E−04 | 7.9E−05 |
| Waste Handling, Treatment, and Disposal (Non-POTW WWT) | 26 | Max | 0.86 | 0.64 | 1.2 | 2.5 | 2.0E−02 | 3.6E−03 | 1.1E−03 | 3.5E−04 | 2.0E−04 | 9.2E−05 | 3.3E−05 |
| Waste Handling, Treatment, and Disposal (POTW) | 61 | Max | 66 | 7.1 | 2.3 | 0.91 | 1.4E−02 | 3.3E−03 | 1.1E−03 | 3.5E−04 | 1.8E−04 | 7.3E−05 | 2.5E−05 |
| Waste Handling, Treatment, and Disposal (Remediation) | 32 | Max | 8.2 | 0.76 | 0.28 | 0.23 | 0.11 | 3.6E−02 | 1.2E−02 | 5.6E−03 | 3.0E−03 | 1.3E−03 | 4.9E−04 |
| Facilities not mapped to and OES[e] | 3 | Max | 0.99 | 0.17 | 5.0E−02 | 2.0E−02 | 2.0E−03 | 6.6E−04 | 3.9E−04 | 2.5E−04 | 1.7E−04 | 1.1E−04 | 5.5E−05 |

| OES | Number of Releases Evaluated in OES[c] | Statistic[d] | 95th Percentile Lifetime Average Daily Concentrations (µg/m³) Estimated at Distances from 10–50,000 m from Release Locations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 10 m | 30 m | 60 m | 100 m | 1,000 m | 2,500 m | 5,000 m | 10,000 m | 15,000 m | 10,000 m | 50,000 m |

HEM5.0 = Human Exposure Model Version 5; NEI = National Emissions Inventory; OES = occupational exposure scenario; POTW = publicly owned treatment works; WWT = wastewater treatment

[a] The full inputs and results are presented in the *Supplemental Information on HEM Exposure and Risk Analysis* (U.S. EPA, 2026m).

[b] EPA considered releases reported to NEI from the years 2014, 2017, and 2020 as the latest data available at the time of this analysis. In the draft risk evaluation, EPA modeled all available data for 2014 and 2017 (U.S. EPA, 2025b). For this evaluation, EPA modeled each facility that showed a risk greater than 1E−06 based on the 95th percentile concentration at 10 m from the release location. EPA also modeled any releases that were new to the 2020 NEI if they were greater than the lowest release from 2014 and 2017 that resulted in a risk greater than 1E−06 based on the 95th percentile concentration at 10 m from the release location. If a facility reported in multiple years and had total releases greater than the threshold described above, then EPA used the maximum release across all years in this analysis.

[c] Number of releases associated with each OES, not the total number of facilities assessed, as a single facility can have multiple release points.

[d] At each distance there are 16 receptors that form a circle around the release location. HEM5.0 calculates an annual average at each point, giving 16 averages. The 95th percentile was calculated for these 16 averages for each release location and distance separately. The maximum (max) values in this table are the highest of the 95th percentile annual average concentrations for each OES.

[e] Facilities were not mapped to an OES in cases where information on the 1,2-dichloroethane use at the site was not available.

**Table 3-3. Maximum 95th Percentile Lifetime Average Daily Ambient Air Concentrations for 1,2-Dichloroethane Using EPA Estimated Releases for Generic Facilities/Sites Modeled Using AERMOD as a Standalone Program [a] [b]**

| OES | Meteorology [c] | Land | 95th Percentile Lifetime Average Daily Concentrations (µg/m³) Estimated at Distances from 10–10,000 m from Releasing Facilities | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 10 m | 30 m | 30–60 m | 60 m | 100 m | 100–1,000 m | 1,000 m | 2,500 m | 5,000 m | 10,000 m |
| Industrial Application of Adhesives and Sealants | High | Rural | 5,789 | 3,003 | 2,430 | 1,496 | 812 | 165 | 36 | 9.0 | 3.1 | 1.0 |
| | High | Urban | 9,140 | 2,721 | 2,146 | 997 | 433 | 56 | 8.5 | 1.9 | 0.60 | 0.20 |
| Commercial Aerosol Products | High | Rural | 21 | 7.3 | 4.6 | 2.7 | 1.2 | 0.11 | 2.3E−02 | 4.8E−03 | 1.5E−03 | 5.1E−04 |
| | High | Urban | 23 | 6.7 | 4.3 | 2.3 | 0.92 | 7.3E−02 | 1.2E−02 | 2.3E−03 | 7.0E−04 | 2.4E−04 |
| Non-Aerosol Cleaning and Degreasing | High | Rural | 1,931 | 535 | 362 | 173 | 65 | 5.4 | 0.48 | 7.9E−02 | 2.7E−02 | 1.3E−02 |
| | High | Urban | 1,941 | 592 | 355 | 169 | 63 | 5.2 | 0.46 | 6.6E−02 | 2.4E−02 | 1.1E−02 |
| Laboratory Use | High | Rural | 0.56 | 0.16 | 0.10 | 5.0E−02 | 1.9E−02 | 1.6E−03 | 1.7E−04 | 2.9E−05 | 9.9E−06 | 4.7E−06 |
| | High | Urban | 0.56 | 0.15 | 0.10 | 5.0E−02 | 1.9E−02 | 1.6E−03 | 1.6E−04 | 2.6E−05 | 8.4E−06 | 3.5E−06 |

AERMOD = American Meteorological Society/Environmental Protection Agency Regulatory (Model); OES = occupational exposure scenario

[a] The full inputs and results are presented in the *Supplemental Information on AERMOD Generic Releases Exposure and Risk Analysis* (U.S. EPA, 2026l)

[b] See *Environmental Release Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026g) for the methods used for to estimate releases for OESs where there were either no or limited site-specific data.

[c] High refers to the meteorological conditions for Lake Charles, LA. Because the data in this table are for generic facilities/sites, the releases were modeled using a meteorological station that tends to provide high-end concentration estimates relative to other stations in the Integrated Indoor Outdoor Air Calculator (IIOAC).

### 3.3.2 HEM5.0 Modeling Results by U.S. Census Block

As described in Section 3.2, HEM5.0 provides cancer risk estimates at the census block level. HEM5.0 calculates an aggregated cancer risk value, or maximum individual risk (MIR), for each census block within 50 km of facility releases. The risk value is calculated by multiplying the aggregate census block ambient air concentration by the IUR. For specific HEM5.0 cancer risk estimates at the census block level, see 1,2-dichloroethane risk evaluation (U.S. EPA, 2026k).

## 3.4 Evidence Integration

The weight of scientific evidence for inhalation exposure estimates is determined by several different evidence streams, including evidence supporting the exposure scenarios (Section 3.2.1), release data by OES used as model input data (U.S. EPA, 2026f, g), and agreement between modeled and monitored ambient air concentrations (U.S. EPA, 2026f).

***Releases***

EPA identified 13 OESs with facility-reported releases of 1,2-dichloroethane to the ambient air: Manufacturing; Repackaging; Processing as a Reactant; Processing into Formulation, Mixture, or Reaction Product; Industrial Application of Adhesives and Sealants; Industrial Application of Lubricants and Greases; Non-Aerosol Cleaning and Degreasing; Laboratory Use; Waste Handling, Treatment, and Disposal (Incinerator); Waste Handling, Treatment, and Disposal (Landfill); Waste Handling, Treatment, and Disposal (Non-POTW WWT); Waste Handling, Treatment, and Disposal (POTW); and Waste Handling, Treatment, and Disposal (Remediation).

EPA identified one OES with no reported releases (Commercial Aerosol Products); therefore, the Agency relied on estimated releases from generic facilities/sites for modeling this OES. Three OESs evaluated had both facility-reported and EPA estimated releases: Industrial Application of Adhesives and Sealants; Non-Aerosol Cleaning and Degreasing; and Laboratory Use (Table 3-4) (U.S. EPA, 2026g). There were additional facilities reporting to NEI that were not mapped to an OES.

EPA has robust confidence in the representativeness of facility-reported releases reported to TRI and NEI. The Agency has slight-to-moderate confidence that the EPA estimated releases from generic facilities/sites are representative of actual releases (U.S. EPA, 2026g). Overall, the confidence in the release data is dependent on the OES and ranges from slight to robust (Table 3-4). Refer to the *Environmental Release Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026g) for more information on the uncertainties related to releases.

***Modeling Methodologies***

EPA used two modeling approaches to estimate ambient air concentrations: (1) using both AERMOD and HEM5.0 to model concentrations at user-defined distances (discrete and area distances) from releasing facilities, and (2) using HEM to model concentrations at the centroid of each census block across the nation. AERMOD has been peer reviewed as part of the regulatory model process described in Appendix W to 40 CFR part 51. HEM5.0 was developed by EPA's Office of Air and Radiation that runs AERMOD as a compiled executable program to model ambient air concentrations. Both HEM5.0 and AERMOD were used in a fit for purpose manner for this 1,2-dichloroethane risk evaluation, and their use is supported by robust confidence. EPA used AERMOD as a standalone model for OES that had EPA estimated releases from generic facilities/sites because they have assumed release locations. EPA used HEM5.0 for all OES that had facility reported releases.

***Release Site Physical Characteristics Input Data***
For 13 of the OESs/COUs evaluated in this assessment, EPA had site-specific, facility-reported releases available for use as direct inputs to AERMOD and HEM5.0. Availability of facility-reported data allows for use of site-specific information—such as facility location, stack height, meteorological data, and land cover—as model inputs. However, some model inputs, such as release days and stack parameters, are not consistently available with a high degree of certainty for all facilities. Therefore, due to the uncertainty in some of the model input parameters, EPA has moderate confidence in the model input data used for AERMOD and HEM5.0 for OESs/COUs with facility-reported releases.

For four OESs/COUs, EPA used estimated releases from generic facilities/sites—either as the only source of release data or in addition to facility-reported releases—to estimate exposures from ambient air. Modeling of EPA-estimated releases requires assumptions concerning release location, meteorological location, land cover parameters, and stack parameters. Each of these assumptions introduces uncertainties that lower the overall confidence relative to releases with site-specific data. Additional uncertainties that lower the confidence and that are associated with the development of estimated releases from generic facilities/sites are discussed in the *Environmental Release Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026g). Therefore, the Agency has slight confidence in the input parameters used to estimate exposures when using EPA-estimated releases from generic facilities/sites. Overall, EPA's confidence in model input data can vary from slight to robust depending on the OES and other factors that are supported by slight-to-moderate evidence (Table 3-4).

***Comparison of Modeled and Monitored Data***
EPA used monitoring stations from the Ambient Monitoring Technology Information Center (AMTIC) archive as user added receptors in the modeling of TRI facilities to compare directly modeled and monitored data near releasing facilities. The comparison shows that annual average and 95th percentile daily modeled concentrations are within approximately an order of magnitude of the mean and 90th percentile monitored 1,2-dichloroethane concentrations at 10 monitoring stations with the highest modeled concentrations. The comparison of estimated and measured exposures shows that the two were similar, which strengthens the confidence that the modeled concentrations are representative of actual concentrations near releasing facilities. See *Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f) for more details.

***Exposure Scenarios and Exposure Factors***
HEM5.0 uses a default lifetime of 70 years with a constant exposure over the entire lifetime. For the generic facilities/sites that used EPA estimated releases and were modeled using AERMOD as a standalone program, the Agency assumed a 78-year lifespan and a constant exposure over an entire lifetime. The 78-year lifespan is the average life expectancy of the general population (U.S. EPA, 2011). An exposure duration of 78 years was assumed to be protective of PESS groups and communities that are located near releasing facilities. It is also consistent with previous recommendations from the SACC (U.S. EPA, 2023). Because these exposure factors are based on peer-reviewed literature, EPA has robust confidence that they are representative of realistic, high-end exposures assuming that the individual lives near the facility their entire life.

***Overall Confidence in Exposure Estimates***
Overall confidences in air inhalation exposure estimates are dependent on the OES and range from slight to robust (Table 3-4). The overall confidence represents specific considerations within each OES and is not necessarily based on an additive approach considering each individual contributing category.

**Table 3-4. Confidence in Each Line of Evidence and Overall Confidence for Each OES**

| OES | Release Data Source | Confidence in Releases (Data Source) [a] | Confidence in Modeling Methodology | Confidence in Release Site Physical Characteristics Modeling Input | Confidence in Modeling/ Monitoring Comparison | Confidence in Exposure Factors/ Scenarios | Overall Confidence [b] |
|---|---|---|---|---|---|---|---|
| Manufacturing | TRI | Robust | Robust | Moderate | Robust | Robust | Robust |
| | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |
| Repackaging | TRI | Robust | Robust | Moderate | Robust | Robust | Robust |
| | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |
| Processing as a Reactant | TRI | Robust | Robust | Moderate | Robust | Robust | Robust |
| | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |
| Processing into Formulation, Mixture, or Reaction Product | TRI | Robust | Robust | Moderate | Robust | Robust | Robust |
| | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |
| Industrial Application of Adhesives and Sealants | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |
| | EPA-estimated releases from generic facilities/sites [d] | Slight | Robust | Slight | Robust | Robust | Slight |
| Application of Lubricants and Greases | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |
| | EPA-estimated releases from generic facilities/sites [d] | Slight | Robust | Slight | Robust | Robust | Slight |
| Commercial Aerosol Products | EPA-estimated releases from generic facilities/sites [d] | Slight | Robust | Slight | Robust | Robust | Slight |
| Non-Aerosol Cleaning and Degreasing | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |
| | EPA-estimated releases from generic facilities/sites [d] | Slight | Robust | Slight | Robust | Robust | Slight |
| Laboratory Use | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |
| | EPA-estimated releases from generic facilities/sites [d] | Moderate | Robust | Slight | Robust | Robust | Moderate |
| Waste Handling, Treatment, and Disposal (Incinerator) | TRI | Robust | Robust | Moderate | Robust | Robust | Robust |
| | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |
| Waste Handling, Treatment, and Disposal (Landfill) | NEI | Slight | Robust | Moderate | Robust | Robust | Slight |
| Waste Handling, Treatment, and Disposal (Non-POTW WWT) | NEI | Slight | Robust | Moderate | Robust | Robust | Slight |
| Waste Handling, | NEI | Slight | Robust | Moderate | Robust | Robust | Slight |

| OES | Release Data Source | Confidence in Releases (Data Source) [a] | Confidence in Modeling Methodology | Confidence in Release Site Physical Characteristics Modeling Input | Confidence in Modeling/ Monitoring Comparison | Confidence in Exposure Factors/ Scenarios | Overall Confidence [b] |
|---|---|---|---|---|---|---|---|
| Treatment, and Disposal (POTW) | | | | | | | |
| Waste Handling, Treatment, and Disposal (Remediation) | NEI | Slight | Robust | Moderate | Robust | Robust | Slight |
| Unknown [c] | NEI | Robust | Robust | Moderate | Robust | Robust | Robust |

AERMOD = American Meteorological Society/Environmental Protection Agency Regulatory (Model); HEM5.0 = Human Exposure Model Version 5; NEI = National Emissions Inventory; OES = occupational exposure scenario; TRI = Toxics Release Inventory

[a] Confidences ascribed to the release data type are supported by the *Environmental Release Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026g), which provides a full description of the methods used to estimate modeled releases and the associated strengths and weaknesses that are influencing the ascribed confidences in this table.

[b] The overall confidence represents specific considerations within each OES and is not necessarily based on an additive approach considering each individual contributing category.

[c] Facilities were not mapped to an OES in cases where information on the 1,2-dichloroethane use at the site was not available.

[d] For OESs where release data were either not available or limited, EPA used alternative release estimates as described in the *Environmental Release Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026g) to model ambient air concentrations around a generic facility under a generic exposure scenario.

# 4 ORAL EXPOSURE ASSESSMENT

Facilities reported 1,2-dichloroethane releases to surface waters from process wastewater discharges and to soil from biosolids application. 1,2-Dichloroethane concentrations in surface water and soil can also be impacted by deposition from ambient air. Once in these media, the fate, physical and chemical, and transport properties (U.S. EPA, 2026c) indicate 1,2-dichloroethane can partition to each media, which in turn can lead to general population exposure to 1,2-dichloroethane via drinking water, incidental ingestion from swimming in receiving water bodies, and soil ingestion. However, exposure levels via the oral route are anticipated to be less than that via inhalation; thus, EPA conducted a screening analysis of the highest exposures resulting from facility-reported releases. The *Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f) describes the methodology and results of estimation of surface water concentration from facility-specific releases.

As described in the *Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f), 1,2-dichloroethane facility-specific releases are monitored and regulated via NPDES permits; therefore, EPA estimated concentrations in the receiving water bodies at the point of discharge of facilities reporting releases of 1,2-dichloroethane. The Agency used the NHDPlus flow data of the receiving water body together with the amount of 1,2-dichloroethane reported in the effluent to estimate concentrations. Since flow metrics vary, the Agency uses a low flow 7Q10 metric (*i.e.,* lowest consecutive 7-day average flow that occurs [on average] during any 10-year period) as a conservative metric for aquatic species assessment. For general population exposures from drinking water or incidental ingestion via swimming in the receiving water body, as described in Sections 4.1 and 4.2 below, EPA uses the less conservative metric of 30Q5 (*i.e.,* lowest consecutive 30-day that occurs [on average] over a 5-year period).

## 4.1 Drinking Water Exposure

In 1974, Congress passed the Safe Drinking Water Act, which has subsequently been amended. This law requires EPA to determine safe levels of chemicals in drinking water to protect public health. EPA has set an enforceable standard called a Maximum Contaminant Level (MCL) for 1,2-dichloroethane at 5 parts per billion (ppb) because EPA has determined, given present technology and resources, that this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in sources of drinking water. These drinking water standards, and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations (NPDWRs). Public water systems must abide by these regulations.

As noted above, 1,2-dichloroethane is reported by facilities as released to surface waters from COUs. EPA refined the drinking water estimates for those facilities that discharge to surface waters that are potential sources of drinking water. That is, the Agency considered the reported releases upstream of a drinking water intake location and estimated the possible exposures resulting from these specific releases at the point of discharge. If EPA identified a downstream drinking water intake location from the release site, the Agency refined the exposure estimates by considering the amount of dilution occurring from the releasing facility discharge point to the drinking water intake location. Receiving water bodies with no downstream drinking water intakes were assumed not to be sources of drinking water and the corresponding facility releases were not included in the drinking water analysis.

### 4.1.1 Modeling Approach

To model drinking water concentrations at the point of drinking water treatment facility intake locations, EPA started with the upstream TSCA facility surface water concentrations estimated at the facility's point of release. Modeled surface water concentrations methodology and results are presented in the

*Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f). Of these high releases, the receiving water bodies were reviewed if they were potential sources of drinking water through a downstream drinking water intake analysis. EPA searched for drinking water treatment facility intake locations within 250 km downstream of releasing facilities and calculated the 1,2-dichloroethane diluted surface water concentration based on distance from release to the drinking water intake and the streamflow (see *Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f) for details). If there were no downstream drinking water intake locations within the 250 km distance, EPA considered there were no drinking water exposures resulting from the facility releases. Therefore, the Agency focused the analysis on those facilities and corresponding COUs with potential drinking water exposures.

EPA used the following equations to estimate acute and chronic exposures for adults and bottle-fed infants. In including infant exposure estimates, the Agency is considering PESS and protecting this sensitive subpopulation.

**Equation 4-1. Acute Drinking Water Ingestion Calculation**

$$ADR = \frac{\left(SWC \times \left(1 - \frac{DWT}{100}\right) \times IR_{dw} \times RD \times CF1\right)}{(BW \times AT)}$$

Where:

| | | |
|---|---|---|
| *ADR* | = | Potential acute dose rate (mg/kg/day) |
| *SWC* | = | Surface water concentration (µg/L; 30Q5 concentration for ADR) |
| *DWT* | = | Removal during drinking water treatment (0%) |
| $IR_{dw}$ | = | Drinking water intake rate (adult: 3.219 L/day; infant: 1.106 L/day) |
| *RD* | = | Release days (1 day for ADR) |
| *CF1* | = | Conversion factor ($1.0\times10^{-3}$ mg/µg) |
| *BW* | = | Body weight (adult: 80 kg; infant: 7.83 kg) |
| *AT* | = | Exposure duration (1 day for ADR) |

**Equation 4-2. Average Daily Drinking Water Ingestion Calculation**

$$ADD = \frac{\left(SWC \times \left(1 - \frac{DWT}{100}\right) \times IR_{dw} \times ED \times RD \times CF1\right)}{(BW \times AT \times CF2)}$$

$$LADD = \frac{\left(SWC \times \left(1 - \frac{DWT}{100}\right) \times IR_{dw} \times ED \times RD \times CF1\right)}{(BW \times AT \times CF2)}$$

Where:

| | | |
|---|---|---|
| *ADD* | = | Potential average daily dose (mg/kg/day) |
| *LADD* | = | Potential lifetime average daily dose (mg/kg/day) |
| *SWC* | = | Surface water concentration (µg/L; harmonic mean for ADD, LADD, LADC) |
| *DWT* | = | Removal during drinking water treatment (%) |
| $IR_{dw}$ | = | Drinking water intake rate (adult: 0.880 L/day; infant: 0.220 L/day) |
| *ED* | = | Exposure duration (years for ADD and LADD) |
| *RD* | = | Release days (days/yr for ADD, LADD, and LADC) |
| *CF1* | = | Conversion factor ($1.0\times10^{-3}$ mg/µg) |

| | | |
|---|---|---|
| *BW* | = | Body weight (adult 80 kg; infant: 7.83 kg) |
| *AT* | = | Exposure duration (57 years for ADD and LADD) |
| *CF2* | = | Conversion factor (365 days/yr) |

Of the 490 facilities reporting releases of 1,2-dichloroethane to surface waters, EPA first considered releases where receiving water body concentrations were above 5 ug/L and identified 9 facility releases that were also associated with possible downstream drinking water intakes. Table 4-1 summarizes the drinking water doses for adults and infants from the facility with the highest downstream drinking water intake concentration for each COU. The remaining facilities had lower downstream concentrations and doses and therefore are not summarized in Table 4-1. (U.S. EPA, 2026e).

**Table 4-1. Drinking Water Exposures to 1,2-Dichloroethane from Highest Concentration at a Drinking Water Intake per COU[a]**

| OES | Number of Facilities with Downstream Drinking Water Intakes[b] | Diluted 30Q5/Harmonic Mean Surface Water Concentrations (µg/L)[c] | Adult (21+ years) | | | Infant (Birth to <1 year) | | |
|---|---|---|---|---|---|---|---|---|
| | | | $ADR_{POT}$ (mg/kg-day) | ADD (mg/kg-day) | LADD (mg/kg-day) | $ADR_{POT}$ (mg/kg-day) | ADD (mg/kg-day) | LADD (mg/kg-day) |
| Processing as a Reactant | 3 | 0.4/0.2 | 1.6E−05 | 2.1E−06 | 1.5E−06 | 5.6E−05 | 5.4E−06 | 3.9E−06 |
| Waste Handling, Treatment, and Disposal (Incinerator) | 1 | 0.1/0.1 | 4.0E−06 | 1.1E−06 | 7.7E−07 | 1.4E−05 | 2.7E−06 | 2.0E−06 |
| Not mapped to OES | – | 0.04/0.04 | 1.6E−06 | 4.2E−07 | 3.1E−07 | 5.6E−06 | 1.1E−06 | 7.9E−07 |

ADD = average daily dose; ADR = acute dose rate; LADD= lifetime average daily dose; OES = occupational exposure scenario; POT = potential

[a] Drinking water system intake locations are not provided to protect the intake latitude/longitude information that is considered critical infrastructure data and masked due to national security concerns.

[b] Drinking water intake locations within 250 km of releasing facility were considered. Surface water concentrations at the intake location were calculated based on stream flow and distance from facility effluent release.

[c] 30Q5 and harmonic mean receiving water flow values used to calculated ADR and ADD.

### 4.1.2 Monitoring Information

1,2-Dichloroethane is a regulated chemical under the NPDWRs and concentrations in drinking water are monitored by public water systems. EPA also collects voluntary submissions of chemical occurrence data, including 1,2-dichloroethane as well as the number of people served by these systems at least every 6 years. The latest EPA chemical occurrence data collection is the fourth Six-Year Review (SYR4) published in February 2024. According to SYR4 data, 0.34% (179) of the 52,209 reporting systems had detects of 1,2-dichloroethane above the minimum reporting level of 0.5 µg/L and only 0.01% (3) of systems serving 1,064 people had levels detected above the MCL of 5 µg/L. 1,2-Dichloroethane drinking water monitoring and occurrence data in the United States are presented and described in detail in the *Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f).

## 4.2 Incidental Ingestion from Swimming

The general population may swim in surface waters (*e.g.,* streams, lakes) that could contain 1,2-dichloroethane from facility releases under COUs. As screening, the highest modeled surface water concentrations included in *Drinking Water Exposure Estimates for 1,2-Dichloroethane* (U.S. EPA, 2026e) at the point of effluent discharge were used to estimate acute dose rates (ADR) resulting from incidental ingestion of 1,2-dichloroethane while swimming in the receiving water body. Only acute exposures were estimated because the highest 1,2-dichloroethane releases associated with each of the OESs are in highly industrialized areas and swimming in these areas such as in the Westlake, Louisiana, discharge location is not anticipated to occur on a chronic basis given contaminated waterways and published warnings and advisories against swimming.[5]

The following equation was used to calculate acute incidental oral (swimming) doses for adults, youth, and children. The highest modeled concentrations were associated with the Waste Handling, Treatment, and Disposal (Non-POTW WWT) OES:

**Equation 4-3. Acute Incidental Ingestion Calculation**

$$ADR = \frac{(SWC \times IR \times ET \times CF1)}{BW}$$

Where:

| | | |
|---|---|---|
| $ADR$ | = | Acute dose rate (mg/kg-day) |
| $SWC$ | = | Surface water concentration (µg/L) |
| $IR$ | = | Daily ingestion rate (adult: 0.092 l/h; youth: 0.152 l/h; child: 0.096 L/h) |
| $ET$ | = | Exposure time (adult: 3 h/day; youth: 2 h/day; child: 1 h/day) |
| $CF1$ | = | Conversion factor ($1.0 \times 10^{-3}$ mg/µg) |
| $BW$ | = | Body weight (adult: 80 kg; youth: 56.8 kg; child: 31.8 kg) |

Table 4-2 summarizes the incidental ingestion acute doses derived from the above equations and modeled surface water concentrations resulting from 2015 to 2024 facility reported releases presented in the *Drinking Water Exposure Estimates for 1,2-Dichloroethane* (U.S. EPA, 2026e). EPA considered exposures based on several life stages (adult, youth, and child) to capture the range of exposures to 1,2-dichloroethane from the swimming scenario. Based on facility-specific release estimates, youth acute exposures are the highest exposures across the assessed life stages. Infants were not assumed to be swimming in these receiving water bodies.

[5] Louisiana swimming advisories are found at: https://deq.louisiana.gov/page/fishing-consumption-and-swimming-advisories (accessed October 16, 2025).

**Table 4-2. Acute Oral (Incidental Ingestion from Swimming) Doses Across Life Stages**

| OES | 1,2-Dichloroethane Surface Water Concentrations | | Adult (21+ years) | Youth (11–15 years) | Child (6–10 years) |
|---|---|---|---|---|---|
| | 30Q5 Conc. (µg/L) | Harmonic Mean Conc. (µg/L) | $ADR_{POT}$ (mg/kg-day) | $ADR_{POT}$ (mg/kg-day) | $ADR_{POT}$ (mg/kg-day) |
| Manufacturing (LA0000761) | 27.3 | 27.3 | 9.5E−05 | 1.5E−04 | 8.2E−05 |
| Processing as a Reactant (IL0000141) | 5 | 5 | 1.7E−05 | 2.7E−05 | 1.5E−05 |
| Processing into Formulation, Mixture, or Reaction Product (NJ0002348) | 1.53 | 1.05 | 5.3E−06 | 8.2E−06 | 4.6E−06 |
| Laboratory Use (MI0001911) | 5.7 | 2.02 | 2.0E−05 | 3.0E−05 | 1.7E−05 |
| Repackaging (LA0056600) | 0.168 | 0.168 | 5.8E−07 | 9.0E−07 | 5.1E−07 |
| Industrial and Commercial Non-Aerosol Cleaning/ Degreasing (NJ0000019) | 0.0124 | 0.00815 | 4.3E−08 | 6.6E−08 | 3.7E−08 |
| Waste Handling, Treatment, and Disposal (POTW), (CA0023671) | 92.7 | 92.7 | 3.2E−04 | 5.0E−04 | 2.8E−04 |
| Waste Handling, Treatment and Disposal (Non-POTW), (PA0080594) | 2200 | 2200 | 7.6E−03 | 1.2E−02 | 6.6E−03 |
| Waste Handling, Treatment and Disposal (Incinerator), (AR003780) | 416 | 416 | 1.4E−03 | 2.2E−03 | 1.3E−03 |
| Waste Handling, Treatment, and Disposal (Landfill), (PA0043818) | 2.67 | 3.45 | 9.2E−06 | 1.4E−05 | 8.1E−06 |
| Waste Handling, Treatment, and Disposal (Remediation), (NV0023621) | 0.99 | 0.71 | 3.4E−06 | 5.3E−06 | 3.0E−06 |

30Q5 = 30 consecutive days of lowest flow (on average) over a 5-year period; ADR = acute dose rate; OES = occupational exposure scenario; POT = potential; POTW = publicly owned treatment works; WWT = wastewater treatment

## 4.3 Incidental Ingestion from Soil (Biosolids and Air Deposition)

EPA considered incidental ingestion (soil pica) of soils contaminated with 1,2-dichloroethane via deposition from ambient air and land application of biosolids for children aged 3 to 6 years.

Concentrations of 1,2-dichloroethane in soils following application of biosolids on agricultural lands were estimated to be 0.63 mg/kg (U.S. EPA, 2026f). The concentration in biosolids was estimated using the highest release from a POTW based on data reported via DMRs from 2015 to 2024. A full description of the methods used to estimate concentrations of 1,2-dichloroethane in soils following application of biosolids is provided in the 1,2-dichloroethane media concentrations TSD (U.S. EPA, 2026f).

Estimates of 1,2-dichloroethane air deposition to soil are also discussed in detail in the 1,2-dichloroethane media concentrations TSD (U.S. EPA, 2026f), which presents the range of calculated soil concentrations corresponding to the emission scenarios considered. The highest estimated soil concentration among all exposure scenarios and COUs was for the Manufacturing OES at 10 m from the releasing facility. This soil concentration was based on the highest estimated annual deposition flux across all receptors divided by 365. EPA considers the highest estimated soil concentrations for this analysis as a high-end screen and did not consider population data at this stage. Annual daily doses of 1,2-dichloroethane for children ingesting soil receiving biosolids were calculated using Equation 4-4.

**Equation 4-4. Average Daily Dose from Soil Ingestion Calculation**

$$ADD = \frac{C \times IR \times EF \times ED \times CF}{BW \times AT}$$

Where:

| | | |
|---|---|---|
| $ADD$ | = | Average daily dose (mg/kg/day) |
| $C$ | = | Soil concentration (mg/kg) |
| $IR$ | = | Intake rate of contaminated soil (mg/day) |
| $EF$ | = | Exposure frequency (day) |
| $ED$ | = | Exposure duration (year) |
| $CF$ | = | Conversion factor ($1.0\times10^{-6}$ kg/mg) |
| $BW$ | = | Body weight (kg) |
| $AT$ | = | Averaging time (non-cancer: $ED \times EF$) |

The recommended intake rate for children aged 3 to 6 years for soil pica (soil ingestion) is 1,000 mg/day (U.S. EPA, 2017). The exposure frequency and exposure duration were both assumed to be one year. Mean body weight (18.6 kg) for 3- to 6-year-olds was taken from EPA's *Exposure Factors Handbook* (U.S. EPA, 2011).

At the estimated 1,2-dichloroethane soil concentration of 0.63 mg/kg due to land application of biosolids, the ADD for a 3- to 6-year-old ingesting 1,000 mg/day of contaminated solids would be $3.39\times10^{-5}$ mg/kg/day. Additionally, at the estimated 1,2-dichloroethane soil concentration of 1.4 mg/kg due to air deposition, the ADD for a 3- to 6-year-old ingesting 1,000 mg/day of contaminated solids would be $7.3\times10^{-5}$ mg/kg/day. EPA acknowledges that although the pica scenario is not highly likely among children in agricultural settings (for biosolids application), it is protective of a condition among young children.

As described in the *Environmental Media Assessment for 1,2-Dichloroethane*, the largest annual land release of 1,2-dichloroethane to landfills reported by TRI-reporting facilities between 2015 to 2024 was 55,924 lb (25,367 kg) in 2023. EPA performed DRAS runs across loading rates that span five orders of magnitude, including one run at 100,000 kg/year, which is approximately one order of magnitude higher than the highest reported loading land release rate. The resulting possible groundwater concentrations were predicted to be less than $8.2\times10^{-3}$ mg/L assuming a maximum leachate concentration of 10 mg/L and a loading rate of 100,000 kg/year. As a drinking water screen, EPA used the groundwater concentration as drinking water exposure. For adults the acute exposure was $3.3\times10^{-4}$ mg/kg-day and the chronic exposure was $8.6\times10^{-5}$ mg/kg-day. For infants, the acute exposure was $1.2\times10^{-3}$ mg/kg-day and the chronic exposure was $2.2\times10^{-4}$ mg/kg-day.

## 4.4 Fish Ingestion Exposure

General population exposures can occur from catching fish and ingesting fish tissue where 1,2-dichloroethane bioaccumulates from surface water impacted by facility releases of 1,2-dichloroethane. EPA based general population exposure estimates from this pathway of exposure on facility release data, the corresponding 1,2-dichloroethane surface water concentrations, fish tissue concentrations, and the consumption of the affected fish tissue. The Agency focused the analysis on the facility releases with the highest surface water concentrations per OES/COU as that correlates with the highest anticipated exposures.

### 4.4.1 Modeling Approach

EPA estimated exposure from fish consumption using age-specific ingestion rates as well as ingestion rates associated with specific lifestyles such as subsistence or tribal fishing. Adult subsistence fish ingestion rates (0.2775 g/kg-day) were used to represent a high-end acute and chronic exposures to 1,2-dichloroethane via the fish ingestion pathway whereas the 90th percentile fish ingestion rate for young toddlers aged between 1 and 2 years (0.412 g/kg-day) represents the high-end acute and chronic for this life stage. Other children's life stages were also included in the fish ingestion estimates and are presented in the supplemental files. Cancer exposure (lifetime average daily dose [LADD]) and risks were also characterized due to the carcinogenic potential of 1,2-dichloroethane (U.S. EPA, 2025e). Exposure estimates via fish ingestion were calculated according to the following equation:

**Equation 4-5. Fish Ingestion Calculation**

$$ADR = \frac{(SWC \times BAF \times IR \times CF1 \times CF2 \times ED)}{AT}$$

Where:

| | | |
|---|---|---|
| *ADR* | = | Acute dose rate (mg/kg/day) |
| *ADD* | = | Average daily dose (mg/kg/day) |
| *SWC* | = | Surface water (dissolved) concentration (µg/L) |
| *BAF* | = | Bioaccumulation factor (L/kg wet weight) |
| *IR* | = | Fish ingestion rate (g/kg-day) |
| *CF1* | = | Conversion factor (0.001 mg/µg) |
| *CF2* | = | Conversion factor for kg/g (0.001 kg/g) |
| *ED* | = | Exposure duration (year) |
| *AT* | = | Averaging time (year) |

The inputs to this equation can be found in the *Fish Ingestion Risk Calculator for 1,2-Dichloroethane* (U.S. EPA, 2026h). The years within an age group (*i.e.,* 62 years for adults) were used for the exposure duration and averaging time to estimate non-cancer exposure. Table 4-3 presents the exposures calculated using highest estimated 1,2-dichloroethane surface water 30Q5 concentrations for acute exposures per COU and harmonic mean concentrations for chronic exposures per COU resulting from the corresponding facility discharges, with modeled bioconcentration factor (BCF = 4.4 L/kg).

**Table 4-3. General Population Fish Ingestion Doses by Surface Water Concentration and OES[a]**

| OES | 1,2-Dichloroethane Surface Water | | Adult (21+ years) | | Young Toddler (1–2 years) | | Adult LADD (mg/kg-day) |
|---|---|---|---|---|---|---|---|
| | 30Q5 Conc. (µg/L) | Harmonic Mean Conc. (µg/L) | $ADR_{POT}$ (mg/kg-day) | ADD (mg/kg-day) | $ADR_{POT}$ (mg/kg-day) | ADD (mg/kg-day) | |
| Manufacturing (LA0000761) | 27.3 | 27.3 | 2.1E−04 | 2.1E−04 | 4.9E−05 | 6.4E−06 | 1.7E−04 |
| Processing as a Reactant (IL0000141) | 5 | 5 | 3.9E−05 | 3.9E−05 | 9.1E−06 | 1.2E−06 | 3.1E−05 |
| Processing into Formulation, Mixture, or Reaction Product (NJ0002348) | 1.53 | 1.05 | 1.2E−05 | 8.2E−06 | 2.8E−06 | 2.4E−07 | 6.5E−06 |
| Laboratory Use (MI0001911) | 5.7 | 2.02 | 4.5E−05 | 1.6E−05 | 1.0E−05 | 4.7E−07 | 1.3E−05 |
| Repackaging (LA0056600) | 0.168 | 0.168 | 1.3E−06 | 1.3E−06 | 9.1E−06 | 1.2E−06 | 1.0E−06 |
| Industrial and Commercial Non-Aerosol Cleaning/ Degreasing (NJ0000019) | 1.2E−02 | 8.2E−03 | 9.7E−08 | 6.4E−08 | 2.2E−08 | 1.9E−09 | 5.1E−08 |
| Waste Handling, Treatment and Disposal (POTW), (CA0023671) | 93 | 93 | 7.3E−04 | 7.3E−04 | 1.7E−04 | 2.2E−05 | 5.8E−04 |
| Waste Handling, Treatment and Disposal (Non-POTW WWT), (PA0080594) | 2,200 | 2,200 | 1.7E−02 | 1.7E−02 | 4.0E−03 | 5.1E−04 | 1.4E−02 |
| Waste Handling, Treatment, and Disposal (Incinerator), (AR003780) | 416 | 416 | 3.3E−03 | 3.3E−03 | 7.5E−04 | 9.7E−05 | 2.6E−03 |
| Waste Handling, Treatment, and Disposal (Landfill), (PA0043818) | 2.7 | 3.5 | 2.1E−05 | 2.7E−05 | 4.8E−06 | 8.1E−07 | 2.1E−05 |
| Waste Handling, Treatment, and Disposal (Remediation), (NV0023621) | 0.99 | 0.71 | 7.7E−06 | 5.6E−06 | 1.8E−06 | 1.7E−07 | 4.4E−06 |

30Q5 = 30 consecutive days of lowest flow (on average) over a 5-year period; ADR = acute dose rate; LADD = lifetime average daily dose; POT = potential; POTW = publicly owned treatment works; WWT = wastewater treatment facility

[a] Fish consumption rate for adult subsistence fishers = 1.78 g/kg-day for both acute and chronic scenarios; differences in estimated dose for acute and chronic are due to differences in 30Q5 vs. harmonic mean concentrations, respectively; young toddler consumption rate (1 to <2 years) = 0.412 g/kg-day (U.S. EPA, 2011)

EPA also identified releases of 1,2-dichloroethane to Chinle Wash from the Chinle Wastewater Treatment Facility located on tribal lands and estimated possible doses of 1,2-dichloroethane from fish ingestion using tribal consumption rates (2.7g/day) that are estimated as 10 times higher than the 95th percentile general population consumption rate. In response to public comments, EPA also included tribal children's consumption rates of 0.2469 g/kg-day for ages 3 to 5 years and 0.3302 g/kg-day for ages 6 to 11 (see Table 4-4). These children's ingestion rates are from the Minganie and Lower North Shorre Tribal regions in Northern Quebec, Canada (Dubeau et al., 2022). This subset of the general population may be considered representative of PESS.

**Table 4-4. Tribal Fish Ingestion Doses from Releases on Tribal Lands[a]**

| OES | 1,2-Dichloroethane Surface Water | | Adult[a] (21+ years) | Youth[b] (6-11 years) | Child[b] (3–5 years) | LADD (mg/kg-day) |
|---|---|---|---|---|---|---|
| | 30Q5 Conc. (ug/L) | Harmonic Mean Conc. (µg/L) | $ADR_{POT}$ (mg/kg-day) | $ADR_{POT}$ (mg/kg-day) | $ADR_{POT}$ (mg/kg-day) | |
| Tribal POTW[c] (NN0020265 Chinle WWTF) | 5.2 | 5.2 | 6.2E−05 | 7.5E−06 | 5.6E−06 | 4.9E−05 |

30Q5 = 30 consecutive days of lowest flow (on average) over a 5-year period; ADR = acute dose rate; LADD = lifetime average daily dose; POT = potential; POTW = publicly owned treatment works
[a] Tribal fish consumption rates: adult only = 2.7 g/kg-day (U.S. EPA, 2011)
[b] Tribal children's consumption rates of 0.2469 g/kg-day for ages 3– 5 and 0.3302 g/kg-day for ages 6–11 (Dubeau et al., 2022)
[c] NPDES permit NN0020265 represents highest concentration of 1,2-dichloroethane from discharges to surface water in tribal lands

## 4.5 Evidence Integration

Facility-specific releases of 1,2-dichloroethane to surface waters are reported to EPA via the NPDES permit required DMR. These data for 2015 to 2024 years and the corresponding receiving water body flow data from NHDPlus are high quality data providing robust confidence in estimating surface water concentrations of 1,2-dichloroethane in receiving water bodies. These surface receiving water concentration estimates are the basis for drinking water exposure, incidental oral exposure from swimming, and exposure via fish ingestion estimates—with higher surface water concentrations correlating to higher exposures. Although EPA estimated surface water concentrations from all facilities reporting releases of 1,2-dichloroethane (see *Environmental Media Assessment for 1,2-Dichloroethane* (U.S. EPA, 2026f)), the Agency focused the analyses for each exposure scenario on the highest facility-specific surface water concentration per OES/COU to capture high-end exposures.

In order to assess the impacts of a COU on drinking water sources, EPA conducted a facility-specific analysis of drinking water estimates downstream of facility releases. These estimates are considered conservative in that only dilution was considered in calculating the surface water concentration at the point of drinking water intakes. Processes such as volatilization within the receiving water flow as well as within the drinking water treatment facility were not quantified and would further decrease the concentrations of 1,2-dichloroethane in finished drinking water. EPA concludes that for all facilities releasing 1,2-dichloroethane upstream of drinking water intakes, the downstream surface water concentration presents low exposures via drinking water.

EPA has robust confidence in the estimate for fish tissue concentration based on the 1,2-dichloroethane surface water concentration for all facility-specific releases and the applied 1,2-dichloroethane bioaccumulation factor. The range of fish consumption rates as listed in the *Exposure Factors Handbook* (U.S. EPA, 2011) were applied to estimate general population exposures from fish ingestion. EPA identified the highest 1,2-dichloroethane surface water concentration on tribal lands (NN0020265) and used tribal ingestion rates for adults as well as children to estimate the resultant tribal exposures to 1,2-dichloroethane from fishing in tribal surface waters.

EPA investigated two incidental soil ingestion pathways—land application of biosolids and deposition from ambient air. For the land application of biosolids scenario, the Agency modeled soil concentrations by using the SimpleTreat 4.0 wastewater treatment plant model to estimate concentrations in biosolids and assuming annual applications of biosolids. Overall, EPA has slight confidence in its exposure estimates for incidental ingestion of soils from biosolids and air deposition; however, the Agency has robust confidence that exposure scenarios modeled represent high-end scenarios that are health protective.

# 5 DERMAL EXPOSURE ASSESSMENT

General population dermal exposures to 1,2-dichloroethane may occur through swimming in surface water (streams and lakes) containing facility releases of 1,2-dichloroethane to surface water. Because facilities reporting surface water releases of 1,2-dichloroethane can are associated with COUs, EPA evaluates dermal exposures to 1,2-dichloroethane in this assessment.

## 5.1 Modeling Approach

Modeled estimates of surface water concentrations from 2015 to 2024 reported facility releases were used to estimate ADR from dermal exposure while swimming. The following equations were used to calculate incidental dermal (swimming) doses for adults, youth, and children:

**Equation 5-1. Acute Incidental Dermal Calculation**

$$ADR = \frac{(SWC \times K_p \times SA \times ET \times CF1 \times CF2)}{BW}$$

Where:

| | | |
|---|---|---|
| $ADR$ | = | Acute dose rate (mg/kg-day) |
| $SWC$ | = | Surface water concentration (ppb or µg/L) |
| $K_p$ | = | Permeability coefficient (cm/h) |
| $SA$ | = | Skin surface area exposed ($cm^2$) |
| $ET$ | = | Exposure time (h/day) |
| $CF1$ | = | Conversion factor ($1.0\times10^{-3}$ mg/µg) |
| $CF2$ | = | Conversion factor ($1.0\times10^{-3}$ $L/cm^3$) |
| $BW$ | = | Body weight (kg) |

The 1,2-dichloroethane skin permeability coefficient used in the equations above was the predicted $K_p$ value presented in the EPA Risk Assessment Guidance for Superfund for organic contaminants in water ($K_p = 4.2\times10^{-3}$ cm/h) (U.S. EPA, 2004). EPA received 1,2-dichloroethane dermal absorption and permeability data from test order submissions; however, the test order data measured 1,2-dichloroethane permeability from a solvent-based vehicle. For the general population swimming scenario, permeability constant ($K_p$) from an aqueous vehicle is more appropriate and is provided in the Superfund guidance cited above.

Table 5-1 summarizes the derived ADRs resulting from dermal exposure while swimming for adults, youth, and children. Dermal doses were calculated with Equation 4-1 using the highest 1,2-dichloroethane surface water concentration across 2015 to 2024 facility releases for each OES resulting from the corresponding facility-specific discharges. The highest acute doses of 1,2-dichloroethane dermal exposures from swimming occur to adults from the Disposal/Waste Handling, Treatment, and Disposal (Non-POTW WWT) COU/OES.

**Table 5-1. Acute Dermal (Swimming) Doses Across Life Stages**

| OES | 1,2-Dichloroethane Surface Water Concentrations | | Adult (21+ years) | Youth (11–15 years) | Child (6–10 years) |
|---|---|---|---|---|---|
| | 30Q5 Conc. (µg/L) | Harmonic Mean Conc. (µg/L) | $ADR_{POT}$ (mg/kg-day) | $ADR_{POT}$ (mg/kg-day) | $ADR_{POT}$ (mg/kg-day) |
| Manufacturing (LA0000761) | 27 | 27 | 2.2E−05 | 1.7E−05 | 1.0E−05 |
| Processing as a Reactant (IL0000141) | 5.0 | 5.0 | 4.0E−06 | 3.1E−06 | 1.9E−06 |
| Processing into Formulation, Mixture, or Reaction Product (NJ0002348) | 1.5 | 1.1 | 1.2E−06 | 9.3E−07 | 5.7E−07 |
| Laboratory Use (MI0001911) | 5.7 | 2.0 | 4.5E−06 | 3.5E−06 | 2.1E−06 |
| Repackaging (LA0056600) | 0.17 | 0.17 | 1.3E−07 | 1.0E−07 | 6.2E−08 |
| Industrial and Commercial Non-Aerosol Cleaning/ Degreasing (NJ0000019) | 1.2E−02 | 8.2E−03 | 9.9E−09 | 7.6E−09 | 4.6E−09 |
| Waste Handling, Treatment, and Disposal (POTW), (CA0023671) | 93 | 93 | 7.4E−05 | 5.7E−05 | 3.4E−05 |
| Waste Handling, Treatment, and Disposal (Non-POTW WWT), (PA0080594) | 2,200 | 2,200 | 1.8E−03 | 1.3E−03 | 8.1E−04 |
| Waste Handling, Treatment, and Disposal (Incinerator), (AR003780) | 416 | 416 | 3.3E−04 | 2.5E−04 | 1.5E−04 |
| Waste Handling, Treatment, and Disposal (Landfill), (PA0043818) | 2.7 | 3.5 | 2.1E−06 | 1.6E−06 | 9.9E−07 |
| Waste Handling, Treatment, and Disposal (Remediation), (NV0023621) | 0.99 | 0.71 | 7.9E−07 | 6.0E−07 | 3.7E−07 |

30Q5 = 30 consecutive days of lowest flow (on average) over a 5-year period; ADR = acute dose rate; OES = occupational exposure scenario; POT = potential

## 5.2 Evidence Integration

EPA estimated general population dermal exposures to 1,2-dichloroethane for people swimming in surface water bodies where facilities associated with COUs reported releases of 1,2-dichloroethane. The facility-specific reported releases and the receiving water body flow data provide facility-specific 1,2-dichloroethane exposure estimates. EPA has robust confidence in the surface water estimates as data regarding the amount and location of releases is provided by facilities and supplemented by location-specific flow statistics. EPA also has robust confidence that the high-end dermal exposure estimates presented in this assessment are representative and health protective based on conservative assumptions included for this evaluation.

# 6 WEIGHT OF SCIENTIFIC EVIDENCE CONCLUSIONS FOR GENERAL POPULATION EXPOSURE ASSESSMENT

## 6.1 Strengths, Limitations, Assumptions, and Key Sources of Uncertainty for the General Population Exposure Assessment

***Ambient Air Inhalation Exposures***

For the weight of scientific evidence for inhalation exposure estimates, EPA considered the specific evidence streams supporting the exposure scenarios (Section 3.2.1), release data used as model input data (U.S. EPA, 2026g), and agreement between modeled and monitored ambient air concentrations (U.S. EPA, 2026f). The overall confidence in air inhalation exposure estimates resulting from modeled ambient air concentrations are dependent on the OES and range from slight to robust. In general, EPA has robust confidence in reported releases and the use of AERMOD and HEM5.0 as the method to estimate ambient air concentrations. EPA had slight or moderate confidence in the use of modeled releases and assumed physical source specifications as model input parameters. The overall confidences for each OES are presented in Table 3-4, represent specific considerations within each OES, and are not necessarily based on an additive approach for considering each individual contributing category.

***Surface Water Exposures***

EPA considered physical and chemical properties to confirm presence in the water column, facility-specific release data and monitoring data as evidence to support the following exposure scenarios: oral and dermal exposure from drinking water, incidental oral and dermal exposure from swimming in surface water, and ingestion exposure from consumption of fish. 1,2-Dichloroethane is soluble in water and if released to water will remain in water. NPDES discharge permits, which require reporting of monitoring data via DMRs, provide evidence for releases to receiving water bodies. TRI also provides facility-specific water release data. The amount of 1,2-dichloroethane released and receiving water body flow (as calculated from the NHDPlus flow database at the point of release) are the main factors affecting the concentration in the receiving water body and the corresponding levels of exposure. EPA assumed that dermal and oral exposures from swimming and fish ingestion occur at the point of discharge where 1,2-dichloroethane surface water concentrations are anticipated to be highest. Assessing exposures at this location represents a high-end estimate and confidence that exposures occurring at downstream locations would be lower.

For exposures via drinking water, releases were considered where they occurred upstream of a drinking water intake location. A dilution was calculated between location of discharge and drinking water intake providing estimates of concentrations of 1,2-dichloroethane in source water prior to treatment. This is also representative of potential concentrations and exposures in drinking water as 1,2-dichloroethane removal during drinking water treatment is expected to be significantly lower than during wastewater treatment processes where agitation promotes volatilization—the primary removal process during wastewater treatment.

***Land Exposures***

EPA investigated the soil ingestion pathway for two scenarios: land application of biosolids, and deposition from ambient air. For the land application of biosolids scenario, the Agency modeled soil concentrations using SimpleTreat 4.0 to estimate concentrations in biosolids and assumed annual applications of biosolids. For the deposition from ambient air scenario, EPA modeled deposition rates from air to land and water from each TRI and NEI releasing facility using AERMOD as a standalone program. The Agency used chemical-specific parameters as input values for AERMOD deposition modeling; however, three parameters (diffusivity in water, diffusivity in air, and cuticular resistance) were obtained outside of the systematic review process used for obtaining other physical and chemical properties. Therefore, EPA has moderate confidence in the deposition fluxes estimated from TRI and NEI release data using AERMOD. Overall, EPA has slight confidence in the accuracy of its exposure estimates for incidental ingestion of soils from biosolids and air deposition due to assumptions made for the exposure scenarios (*e.g.,* ingestion rate) and uncertainties in the media concentrations; however, the Agency has robust confidence that exposure scenarios modeled represent high-end scenarios that are health protective based on conservative assumptions included in this assessment for the oral pathway.

# 7 GENERAL POPULATION EXPOSURE ASSESSMENT CONCLUSIONS

The general population can be exposed to 1,2-dichloroethane via air, water, and land pathways as shown in Table 1-2.

EPA estimated ambient air concentrations and deposition rates at varying distances from facilities releasing 1,2-dichloroethane to air and the corresponding exposures. EPA next evaluated inhalation exposures for all facilities reporting releases to TRI, NEI, or both across five OESs. The highest inhalation exposures associated with reported releases were from the Manufacturing OES. The Agency has robust confidence in these inhalation exposure estimates as they are produced by robust regulatory models using site-specific, facility-reported releases as direct inputs. For the four OESs with either no or limited reported data, the Agency relied on EPA-estimated releases from generic facilities/sites as direct inputs to the associated models to estimate inhalation exposures. Overall, the highest chronic inhalation exposures were from the OES of Industrial Application of Adhesives and Sealants. EPA has slight or moderate confidence in the accuracy of the estimated inhalation exposures due to the number of assumptions used; however, due to conservative nature of these assumptions, the Agency has moderate confidence that the estimated inhalation exposures are health protective. Additionally, EPA used high-end facility reported releases from TRI (Section 3.2) to assess aggregate general population exposures via ambient air.

EPA estimated surface water concentrations from all facilities reporting releases from 2015 to 2024 of 1,2-dichloroethane (U.S. EPA, 2026f). The Agency used these concentrations to evaluate exposures from ingestion of drinking water, incidental ingestion of and dermal absorption from surface water while swimming, and ingestion of fish. The highest exposures resulted from releases to surface water from the Disposal/Waste Handling, Treatment, and Disposal (Non-POTW WWT) COU/OES. EPA has robust confidence that these estimated exposures represent a high-end exposure because the Agency relied upon the highest facility-specific surface water concentration per COU and several conservative assumptions to ensure potential exposures were not missed.

EPA quantitatively assessed general population exposures from releases of 1,2-dichloroethane to land via POTW biosolids application to agricultural lands. Once biosolids have been applied, they could be a source of exposure to children via pica living in proximity to or on these same agricultural lands. EPA acknowledges that the pica scenario is not highly likely among children in agricultural settings (for biosolids application); however, it is protective of a condition that is not unusual among young children that can be reasonably anticipated. The Agency has robust confidence that the modeled exposure scenarios via the land pathways are health protective and represent high-end scenarios.

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