



United States  
Environmental Protection Agency

# Draft General Population Exposure Assessment for 1,2-Dichloroethane

## Technical Support Document for the Draft Risk Evaluation

CASRN 107-06-2



November 2025

## TABLE OF CONTENTS

---

|                                                                                                                                 |    |
|---------------------------------------------------------------------------------------------------------------------------------|----|
| ACKNOWLEDGEMENTS .....                                                                                                          | 5  |
| SUMMARY .....                                                                                                                   | 6  |
| 1 INTRODUCTION .....                                                                                                            | 7  |
| 2 APPROACH AND METHODOLOGY OVERVIEW .....                                                                                       | 14 |
| 3 AMBIENT AIR INHALATION EXPOSURE ASSESSMENT .....                                                                              | 16 |
| 3.1 AERMOD Modeling Approach.....                                                                                               | 16 |
| 3.1.1 Exposure Estimates.....                                                                                                   | 17 |
| 3.2 HEM Modeling Approach .....                                                                                                 | 17 |
| 3.2.1 HEM Settings.....                                                                                                         | 18 |
| 3.2.2 Aggregate and Demographic Model Outputs .....                                                                             | 21 |
| 3.2.3 Inhalation Exposure Estimates for Fenceline Communities.....                                                              | 21 |
| 3.3 Summary of Ambient Air Exposure .....                                                                                       | 21 |
| 3.3.1 Ambient Air Exposure using AERMOD Modeled Concentrations .....                                                            | 22 |
| 3.3.2 HEM Modeling Results by U.S. Census Block.....                                                                            | 27 |
| 3.4 Evidence Integration.....                                                                                                   | 27 |
| 4 ORAL EXPOSURE ASSESSMENT.....                                                                                                 | 31 |
| 4.1 Drinking Water Exposure .....                                                                                               | 31 |
| 4.1.1 Modeling Approach .....                                                                                                   | 31 |
| 4.1.2 Monitoring Information .....                                                                                              | 33 |
| 4.2 Incidental Ingestion from Swimming .....                                                                                    | 34 |
| 4.3 Incidental Ingestion from Soil (Biosolids and Air Deposition).....                                                          | 35 |
| 4.4 Fish Ingestion Exposure .....                                                                                               | 36 |
| 4.4.1 Modeling Approach .....                                                                                                   | 36 |
| 4.5 Evidence Integration.....                                                                                                   | 37 |
| 5 DERMAL EXPOSURE ASSESSMENT .....                                                                                              | 39 |
| 5.1 Modeling Approach .....                                                                                                     | 39 |
| 5.2 Evidence Integration.....                                                                                                   | 40 |
| 6 WEIGHT OF SCIENTIFIC EVIDENCE CONCLUSIONS FOR GENERAL<br>POPULATION EXPOSURE ASSESSMENT .....                                 | 41 |
| 6.1 Strengths, Limitations, Assumptions, and Key Sources of Uncertainty for the General<br>Population Exposure Assessment ..... | 41 |
| 7 GENERAL POPULATION EXPOSURE ASSESSMENT CONCLUSIONS .....                                                                      | 43 |
| REFERENCES.....                                                                                                                 | 44 |

## LIST OF TABLES

---

|                                                                                                    |    |
|----------------------------------------------------------------------------------------------------|----|
| Table 1-1. Crosswalk of COUs to Assessed OESs .....                                                | 8  |
| Table 1-2. Summary of Environmental Releases by Occupational Exposure Scenarios .....              | 10 |
| Table 2-1. Exposure Scenarios Assessed.....                                                        | 15 |
| Table 3-1. Settings for “Facility List” Input File in HEM.....                                     | 19 |
| Table 3-2. Substitutions Made for the Facility List File’s “Model_Distmodel_dist” Parameter in HEM | 20 |

|    |                                                                                                    |    |
|----|----------------------------------------------------------------------------------------------------|----|
| 69 | Table 3-3. Assumptions for Interday Emission-Release Pattern Using HEM.....                        | 20 |
| 70 | Table 3-4. Physical Source Specifications for HEM .....                                            | 21 |
| 71 | Table 3-5. Maximum 95th Percentile Lifetime Average Daily Ambient Air Concentrations for 1,2-      |    |
| 72 | Dichloroethane Releases Reported to TRI from 2015–2020 Modeled Using AERMOD as                     |    |
| 73 | a Standalone Program .....                                                                         | 23 |
| 74 | Table 3-6. Maximum 95th Percentile Lifetime Average Daily Ambient Air Concentrations for 1,2-      |    |
| 75 | Dichloroethane Releases Reported to NEI for the Reporting Years of 2014 and 2017                   |    |
| 76 | Modeled Using AERMOD as a Standalone Program.....                                                  | 24 |
| 77 | Table 3-7. Maximum 95th Percentile Lifetime Average Daily Concentrations for 1,2-Dichloroethane    |    |
| 78 | Releases Reported to NEI for Municipal Solid Waste Landfills for the Reporting Years of            |    |
| 79 | 2014 and 2017 Modeled Using AERMOD as a Standalone Program .....                                   | 25 |
| 80 | Table 3-8. Maximum 95th Percentile Lifetime Average Daily Ambient Air Concentrations for 1,2-      |    |
| 81 | Dichloroethane Using EPA Estimated Releases for Generic Facilities/Sites Modeled                   |    |
| 82 | Using AERMOD as a Standalone Program .....                                                         | 26 |
| 83 | Table 3-9. Confidence in Each Line of Evidence and Overall Confidence for Each OES.....            | 29 |
| 84 | Table 4-1. Drinking Water Exposures to 1,2-Dichloroethane from Highest Concentration at a Drinking |    |
| 85 | Water Intake per COU .....                                                                         | 33 |
| 86 | Table 4-2. Acute Oral (Incidental Ingestion from Swimming) Doses Across Lifestages .....           | 34 |
| 87 | Table 4-3. General Population Fish Ingestion Doses by Surface Water Concentration and COU/OES ..   | 37 |
| 88 | Table 5-1. Acute Dermal (Swimming) Doses Across Lifestages .....                                   | 39 |

89

## 90 KEY ABBREVIATIONS AND ACRONYMS

---

|     |        |                                                                                  |
|-----|--------|----------------------------------------------------------------------------------|
| 91  | 30Q5   | Lowest 30-day average flow that occurs (on average) once every 5 years           |
| 92  | 7Q10   | Lowest 7-day average flow that occurs (on average) once every 10 years           |
| 93  | AAMG   | Ambient Air Monitoring Group                                                     |
| 94  | AC     | Acute concentration                                                              |
| 95  | ADC    | Average daily concentrations                                                     |
| 96  | ADD    | Average daily dose                                                               |
| 97  | ADR    | Acute dose rate                                                                  |
| 98  | AERMOD | American Meteorological Society/Environmental Protection Agency Regulatory Model |
| 99  | AF     | Assessment factor                                                                |
| 100 | AMTIC  | Ambient Monitoring Technology Information Center                                 |
| 101 | CASRN  | Chemical Abstracts Service Registry Number                                       |
| 102 | COU    | Condition of use                                                                 |
| 103 | DMR    | Discharge Monitoring Report                                                      |
| 104 | DRAS   | Hazardous Waste Delisting Risk Assessment Software (Model)                       |
| 105 | E-FAST | Exposure and Fate Assessment Screening Tool (Model)                              |
| 106 | EPA    | Environmental Protection Agency (U.S.)                                           |
| 107 | HEM    | Human Exposure Model                                                             |
| 108 | IIOAC  | Integrated Indoor Outdoor Air Calculator (Model)                                 |
| 109 | IR     | Ingestion rate                                                                   |
| 110 | IUR    | Inhalation unit risk                                                             |
| 111 | KOA    | Octanol-air partition coefficient                                                |
| 112 | LADC   | Lifetime average daily concentrations                                            |
| 113 | LADD   | Lifetime average daily dose                                                      |
| 114 | MCL    | Maximum Contaminant Level                                                        |
| 115 | MIR    | Maximum Individual Risk                                                          |
| 116 | NAICS  | North American Industry Classification System                                    |
| 117 | NEI    | National Emissions Inventory                                                     |

|     |       |                                                           |
|-----|-------|-----------------------------------------------------------|
| 118 | NPDES | National Pollutant Discharge Elimination System           |
| 119 | OCSP  | Office of Chemical Safety and Pollution Prevention (U.S.) |
| 120 | OES   | Occupational exposure scenario                            |
| 121 | OPPT  | Office of Pollution Prevention and Toxics (U.S.)          |
| 122 | PESS  | Potentially exposed sensitive subpopulation               |
| 123 | POTW  | Publicly owned treatment works                            |
| 124 | SDWA  | Safe Drinking Water Act                                   |
| 125 | TRI   | Toxics Release Inventory                                  |
| 126 | TSCA  | Toxic Substances Control Act                              |
| 127 | TSD   | Technical support document                                |
| 128 | URE   | Unit risk estimate                                        |
| 129 | U.S.  | United States                                             |

## ACKNOWLEDGEMENTS

---

The Assessment Team gratefully acknowledges the participation, review, and input from U.S. Environmental Protection Agency (EPA or the Agency) Office of Pollution Prevention and Toxics (OPPT) and Office of Chemical Safety and Pollution Prevention (OCSPP) senior managers and science advisors. The Agency is also grateful for assistance from the following EPA contractor for the preparation of this draft technical support document (TSD): ICF (Contract No. 68HERC23D0007).

### **Docket**

Supporting information can be found in the public docket, Docket ID [EPA-HQ-OPPT-2018-0427](#).

### **Disclaimer**

Reference herein to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise does not constitute or imply its endorsement, recommendation, or favoring by the United States Government.

**Authors:** Andrew Middleton, Nerija Orentas (TSD Leads), Albana Bega (Assessment Lead), and Seema Schappelle (Branch Supervisor)

**Contributors:** Jason Todd, Kiet Ly, and Kevin Vuilleumier

**Technical Support:** Mark Gibson, Hillary Hollinger, Lauren Housley, and Kelley Stanfield

## SUMMARY

---

This technical support document (TSD) accompanies the Toxic Substances Control Act (TSCA) *Draft Risk Evaluation for 1,2-Dichloroethane* (also called the “draft risk evaluation”) ([U.S. EPA, 2025i](#)) and describes exposure to the general population from releases of 1,2-dichloroethane associated with TSCA conditions of use (COUs).

EPA 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.
  - For exposures to 1,2-dichloroethane through ambient air, EPA considered potential exposures for communities within 10 km of a release site using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). AERMOD-modeled ambient air concentrations were then used to estimate acute and chronic inhalation exposures to the general population (Sections 3.1 and 3.3.1). Additionally, the Human Exposure Model (HEM) was used to estimate exposures at a U.S. census block level and identify exposed populations up to 50 km from releasing facilities (Sections 3.1.1 and 3.2.2).
    - Exposures from industrial releases of 1,2-dichloroethane that can be attributed to COUs based on the AERMOD 95th percentile modeled concentrations ranged from 0.0 to 6.4  $\mu\text{g}/\text{m}^3$  at 1,000 m from facility releases, with the highest exposure being attributed the Manufacturing OES.
  - EPA estimated inhalation exposures for estimated releases from generic facilities/sites with industrial activities mapped to standardized occupational exposure scenarios (OESs) where there were limited or no reported data on releases (Sections 3.3.1 and 3.2.3). Exposures based on the AERMOD 95th percentile modeled concentrations ranged from 0.0 to 32  $\mu\text{g}/\text{m}^3$  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 while swimming (Sections 4.2 and 5.1), and fish ingestion (Section 4.4.1).
  - 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 from 1,2-dichloroethane 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. 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 percent 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 *Draft Environmental Media Concentrations Assessment for 1,2-Dichloroethane* (also called the “1,2-dichloroethane media concentrations TSD”) ([U.S. EPA, 2025e](#)). 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 as detailed in the *Draft Environmental Release Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025f](#)). EPA estimated concentrations of 1,2-dichloroethane in different media using facility-reported releases ([U.S. EPA, 2025e](#)). Based on the chemical properties and fate parameters detailed in the *Draft Chemistry and Fate and Transport Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025b](#)), and as further supported by the monitoring data ([U.S. EPA, 2025e](#)), 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 percent of the releases reported to the Toxics Release Inventory (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 ( $\cdot\text{OH}$ ). 1,2-Dichloroethane 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). 1,2-Dichloroethane released to wastewater treatment facilities is 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, 2025f](#)). The Agency used these facility-specific reported releases (*i.e.*, data from TRI, National Emissions Inventory [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, 2025f](#)).

Table 1-1 provides a crosswalk between COUs and occupational exposure scenarios (OESs) by lifecycle stage. Table 1-2 presents the exposures assessed per OES based on the corresponding media to which 1,2-dichloroethane is released.

228

**Table 1-1. Crosswalk of COUs to Assessed OESs**

| COU                           |                                                                          |                                                                                                                                                                                          | OES                                                       |
|-------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Life Cycle Stage <sup>a</sup> | Category <sup>b</sup>                                                    | Subcategory <sup>c</sup>                                                                                                                                                                 |                                                           |
| Manufacturing                 | Domestic manufacture                                                     | Domestic manufacture                                                                                                                                                                     | Manufacturing <sup>d</sup>                                |
|                               | 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 <sup>e</sup>                     |
| Industrial Use                | Adhesives and sealants                                                   | Adhesives and sealants                                                                                                                                                                   | Industrial application of adhesives and sealants          |
|                               | Functional fluids (closed systems)                                       | Heat transferring agent                                                                                                                                                                  | Heat transferring agent <sup>f</sup>                      |
|                               | Lubricants and greases                                                   | Solid film lubricants and greases                                                                                                                                                        | Industrial application of lubricants and greases          |
|                               | Process regulator                                                        | <i>e.g.</i> , 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                       |
| Commercial Use                | Other use                                                                | Process solvent                                                                                                                                                                          | Processing into formulation, mixture, or reaction product |
|                               | Plastic and rubber products                                              | Products such as: plastic and rubber products                                                                                                                                            | Plastic and rubber products <sup>f</sup>                  |
|                               | Fuels and related products                                               | Fuels and related products                                                                                                                                                               | Fuels and related products <sup>f</sup>                   |
| Consumer Use                  | Other use                                                                | Laboratory chemical                                                                                                                                                                      | Laboratory use                                            |
|                               | Plastic and rubber products                                              | Plastic and rubber products                                                                                                                                                              | N/A <sup>g</sup>                                          |

| COU                           |                       |                          | OES                                                          |
|-------------------------------|-----------------------|--------------------------|--------------------------------------------------------------|
| Life Cycle Stage <sup>a</sup> | Category <sup>b</sup> | Subcategory <sup>c</sup> |                                                              |
| Disposal                      | Disposal              | Disposal                 | Waste handling, treatment, and disposal (landfill)           |
|                               |                       |                          | Waste handling, treatment, and disposal (POTW, non-POTW WWT) |
|                               |                       |                          | Waste handling, treatment, and disposal (remediation)        |

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

<sup>a</sup> Life Cycle Stage use definitions (40 CFR 711.3)

- “Industrial use” means use at a site at which one 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.

<sup>b</sup> These categories of COUs reflect CDR codes and broadly represent conditions of use for 1,2-dichloroethane in industrial and/or commercial settings.

<sup>c</sup> These subcategories reflect more specific uses of 1,2-dichloroethane.

<sup>d</sup> During the manufacture of 1,2-dichloroethane, the byproducts 1,1-dichloroethane (75-34-3), 1,1,2-trichloroethane (79-00-5), *trans*-1,2-dichloroethylene (156-60-5), trichloroethylene (79-01-6), perchloroethylene (127-18-4), methylene chloride (75-09-2), and carbon tetrachloride (56-23-5) are formed, and are assessed in this risk evaluation or subsequent risk evaluations. See *Draft Byproducts Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025a](#)).

<sup>e</sup> 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 Department of Transportation (DOT) and National Response Center (NRC) data for incident reports pertaining to 1,2-dichloroethane distribution.

<sup>f</sup> Though 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 *Draft Environmental Release Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025f](#)) and *Draft Occupational Exposure Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025h](#)).

<sup>g</sup> Consumer uses are not assigned to OESs but are assessed elsewhere in this draft TSD or draft risk evaluation. See the *Draft Consumer Exposure Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025c](#)).

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

| OES                                                       | Type of Discharge, <sup>a</sup> Air Emission, <sup>b</sup> or Transfer for Disposal <sup>c</sup> | Estimated Annual Release (kg/site-yr) <sup>d</sup> |          | Estimated Daily Release (kg/site-day) <sup>e</sup> |          | Number of Facilities <sup>f</sup> | Source(s) |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------|----------|----------------------------------------------------|----------|-----------------------------------|-----------|
|                                                           |                                                                                                  | Central Tendency <sup>g</sup>                      | High-End | Central Tendency                                   | High-End |                                   |           |
| Manufacturing                                             | Surface water                                                                                    | 1.0                                                | 56       | 2.8E-03                                            | 0.16     | 33                                | TRI/DMR   |
|                                                           | Fugitive air                                                                                     | 3,125                                              | 1.6E04   | 8.9                                                | 46       | 23                                | TRI       |
|                                                           | Stack air                                                                                        | 1,466                                              | 1.2E04   | 4.2                                                | 35       | 22                                | TRI       |
|                                                           | Fugitive air                                                                                     | 2,360                                              | 6,578    | 6.7                                                | 19       | 10                                | NEI       |
|                                                           | Stack air                                                                                        | 241                                                | 6,779    | 0.69                                               | 19       | 12                                | NEI       |
|                                                           | Land                                                                                             | 2.3                                                | 247      | 6.5E-03                                            | 0.71     | 14                                | TRI       |
| Repackaging                                               | Surface water                                                                                    | 1.3E-02                                            | 103      | 5.1E-05                                            | 0.41     | 19                                | TRI/DMR   |
|                                                           | Fugitive air                                                                                     | 170                                                | 227      | 0.68                                               | 0.91     | 4                                 | TRI       |
|                                                           | Stack air                                                                                        | 170                                                | 227      | 0.68                                               | 0.91     | 4                                 | TRI       |
|                                                           | Fugitive air                                                                                     | 1.4E-02                                            | 105      | 5.7E-05                                            | 0.42     | 28                                | NEI       |
|                                                           | Stack air                                                                                        | 4.2                                                | 588      | 1.7E-02                                            | 2.4      | 11                                | NEI       |
| Processing as a reactant                                  | Surface water                                                                                    | 0.24                                               | 103      | 6.8E-04                                            | 0.29     | 22                                | TRI/DMR   |
|                                                           | Fugitive air                                                                                     | 45                                                 | 370      | 0.13                                               | 1.1      | 10                                | TRI       |
|                                                           | Stack air                                                                                        | 6.8                                                | 252      | 1.9E-02                                            | 0.72     | 11                                | TRI       |
|                                                           | Fugitive air                                                                                     | 88                                                 | 9,697    | 0.25                                               | 28       | 17                                | NEI       |
|                                                           | Stack air                                                                                        | 24                                                 | 3,439    | 6.8E-02                                            | 9.8      | 17                                | NEI       |
|                                                           | Land                                                                                             | 3.6                                                | 29       | 1.0E-02                                            | 8.2E-02  | 1                                 | TRI       |
| Processing into formulation, mixture, or reaction product | Surface water                                                                                    | 0.27                                               | 11       | 9.1E-04                                            | 3.7E-02  | 20                                | TRI/DMR   |
|                                                           | Fugitive air                                                                                     | 113                                                | 2,232    | 0.38                                               | 7.4      | 9                                 | TRI       |
|                                                           | Stack air                                                                                        | 68                                                 | 976      | 0.23                                               | 3.3      | 11                                | TRI       |
|                                                           | Fugitive air                                                                                     | 74                                                 | 4,795    | 0.25                                               | 16       | 6                                 | NEI       |
|                                                           | Stack air                                                                                        | 1,269                                              | 4,288    | 4.2                                                | 14       | 4                                 | NEI       |

PUBLIC RELEASE DRAFT  
November 2025

| OES                                                       | Type of Discharge, <sup>a</sup> Air Emission, <sup>b</sup> or Transfer for Disposal <sup>c</sup> | Estimated Annual Release (kg/site-yr) <sup>d</sup> |                     | Estimated Daily Release (kg/site-day) <sup>e</sup> |          | Number of Facilities <sup>f</sup> | Source(s)                                                                                                                                                                         |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------|----------------------------------------------------|----------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                           |                                                                                                  | Central Tendency <sup>g</sup>                      | High-End            | Central Tendency                                   | High-End |                                   |                                                                                                                                                                                   |
| Industrial application of adhesives and sealants          | Fugitive air                                                                                     | 2.4                                                | 338                 | 9.0E-03                                            | 1.3      | 38                                | NEI                                                                                                                                                                               |
|                                                           | Stack air                                                                                        | 4.5                                                | 282                 | 1.7E-02                                            | 1.1      | 65                                | NEI                                                                                                                                                                               |
|                                                           | Fugitive or stack air                                                                            | 1.3E05 <sup>h</sup>                                | 1.3E05 <sup>h</sup> | 1,674                                              | 4,647    | N/A                               | Environmental release modeling                                                                                                                                                    |
|                                                           | Hazardous landfill or incineration                                                               | 4,406                                              | 4,953               | 59                                                 | 165      | N/A                               | Environmental release modeling – Modeled releases to incineration are further assessed by applying a DRE to estimate the resulting stack air release                              |
| Industrial application of lubricants and greases          | Fugitive air                                                                                     | 7.3E-02                                            | 82                  | 2.9E-04                                            | 0.33     | 2                                 | NEI                                                                                                                                                                               |
|                                                           | Stack air                                                                                        | 8.8E-03                                            |                     | 3.5E-05                                            |          | 1                                 | NEI                                                                                                                                                                               |
| Industrial and commercial non-aerosol cleaning/degreasing | Surface water                                                                                    | 0.13                                               | 0.26                | 5.2E-04                                            | 1.0E-03  | 3                                 | TRI/DMR                                                                                                                                                                           |
|                                                           | Fugitive air                                                                                     | 1.5                                                | 41                  | 6.0E-03                                            | 0.17     | 12                                | NEI                                                                                                                                                                               |
|                                                           | Stack air                                                                                        | 3.5                                                | 455                 | 1.4E-02                                            | 1.8      | 15                                | NEI                                                                                                                                                                               |
|                                                           | Fugitive or stack air                                                                            | 1.3E04                                             | 4.2E04              | 42                                                 | 141      | N/A                               | Environmental release modeling                                                                                                                                                    |
|                                                           | Wastewater treatment                                                                             | 662                                                | 2,606               | 2.2                                                | 8.8      | N/A                               | Environmental release modeling – Modeled releases to wastewater treatment are further assessed by applying a removal efficiency to estimate the resulting surface water discharge |
|                                                           | Hazardous waste incineration                                                                     | 7,152                                              | 3.1E04              | 24                                                 | 103      | N/A                               | Environmental release modeling – Modeled releases to incineration are further assessed by applying a DRE to estimate the resulting stack air release                              |
|                                                           | Hazardous waste landfill                                                                         | 64                                                 | 255                 | 0.24                                               | 0.86     | N/A                               | Environmental release modeling                                                                                                                                                    |

PUBLIC RELEASE DRAFT  
November 2025

| OES                                                   | Type of Discharge, <sup>a</sup> Air Emission, <sup>b</sup> or Transfer for Disposal <sup>c</sup> | Estimated Annual Release (kg/site-yr) <sup>d</sup> |          | Estimated Daily Release (kg/site-day) <sup>e</sup> |          | Number of Facilities <sup>f</sup> | Source(s)                                                                                                                                            |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------|----------|----------------------------------------------------|----------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                       |                                                                                                  | Central Tendency <sup>g</sup>                      | High-End | Central Tendency                                   | High-End |                                   |                                                                                                                                                      |
| Commercial aerosol products                           | Fugitive air                                                                                     | 379                                                | 382      | 1.5                                                | 1.5      | N/A                               | Environmental release modeling                                                                                                                       |
| Laboratory use                                        | Surface water                                                                                    | 6.7E-03                                            | 6.9E-02  | 2.6E-05                                            | 2.6E-04  | 4                                 | TRI/DMR                                                                                                                                              |
|                                                       | Fugitive air                                                                                     | 1.3                                                | 10       | 5.2E-03                                            | 3.8E-02  | 6                                 | NEI                                                                                                                                                  |
|                                                       | Stack air                                                                                        | 126                                                | 233      | 0.48                                               | 0.90     | 2                                 | NEI                                                                                                                                                  |
|                                                       | Fugitive or stack air                                                                            | 1.7                                                | 11       | 7.3E-03                                            | 4.5E-02  | N/A                               | Environmental release modeling                                                                                                                       |
|                                                       | Hazardous landfill or incineration                                                               | 15                                                 | 812      | 6.5E-02                                            | 3.5      | N/A                               | Environmental release modeling – Modeled releases to incineration are further assessed by applying a DRE to estimate the resulting stack air release |
| Waste handling, treatment and disposal (non-POTW WWT) | Surface water                                                                                    | 0.03                                               | 28       | 1.0E-04                                            | 0.11     | 17                                | TRI/DMR                                                                                                                                              |
|                                                       | Fugitive air                                                                                     | 2.2                                                | 181      | 9.0E-03                                            | 0.73     | 17                                | TRI                                                                                                                                                  |
|                                                       | Stack air                                                                                        | 1.0                                                | 112      | 4.0E-03                                            | 0.45     | 17                                | TRI                                                                                                                                                  |
|                                                       | Fugitive air                                                                                     | 4.8                                                | 44       | 1.9E-02                                            | 0.18     | 725                               | NEI                                                                                                                                                  |
|                                                       | Stack air                                                                                        | 0.25                                               | 35       | 9.9E-04                                            | 0.14     | 199                               | NEI                                                                                                                                                  |
| Waste handling, disposal and treatment (POTW)         | Surface water                                                                                    | 0.63                                               | 30       | 1.7E-03                                            | 8.3E-02  | 141                               | TRI/DMR                                                                                                                                              |
| Waste handling, disposal and treatment (remediation)  | Surface water                                                                                    | 1.5E-02                                            | 0.18     | 4.2E-05                                            | 4.9E-04  | 19                                | TRI/DMR                                                                                                                                              |
|                                                       | Fugitive air                                                                                     | 5.2                                                |          | 1.4E-02                                            |          | 1                                 | NEI                                                                                                                                                  |
|                                                       | Stack air                                                                                        | 816                                                | 1,438    | 2.2                                                | 3.9      | 3                                 | NEI                                                                                                                                                  |

DMR = Discharge Monitoring Report; DRE = destruction removal efficiency; NEI = National Emissions Inventory; POTW = publicly owned treatment works; TRI = Toxic Release Inventory; WWT = wastewater treatment; DRE = destruction or removal efficiency

<sup>a</sup> Direct discharge to surface water; indirect discharge to non-POTW WWT; indirect discharge to POTW

<sup>b</sup> Emissions via fugitive air, stack air, or treatment via incineration

<sup>c</sup> Transfer to surface impoundment, land application, or landfills

<sup>d</sup> 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 or more reporting facilities, EPA estimated

| OES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Type of Discharge, <sup>a</sup> Air Emission, <sup>b</sup> or Transfer for Disposal <sup>c</sup> | Estimated Annual Release (kg/site-yr) <sup>d</sup> |          | Estimated Daily Release (kg/site-day) <sup>e</sup> |          | Number of Facilities <sup>f</sup> | Source(s) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------|----------|----------------------------------------------------|----------|-----------------------------------|-----------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                  | Central Tendency <sup>g</sup>                      | High-End | Central Tendency                                   | High-End |                                   |           |
| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                  |                                                    |          |                                                    |          |                                   |           |
| <sup>e</sup> Where available, EPA used peer reviewed literature ( <i>e.g.</i> , GSs or ESDs) to provide a basis to estimate the number of release days of 1,2-dichloroethane within a COU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                  |                                                    |          |                                                    |          |                                   |           |
| <sup>f</sup> Where available, EPA used the 2020 CDR ( <a href="#">U.S. EPA, 2020a</a> ), NEI ( <a href="#">U.S. EPA, 2023a</a> ), DMR ( <a href="#">U.S. EPA, 2022a</a> ), and TRI databases ( <a href="#">U.S. EPA, 2022b</a> ), 2020 U.S. County Business Practices ( <a href="#">U.S. Census Bureau, 2022</a> ), 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 one value. There were 186 facilities not mapped to an OES (45 in NEI, 1 in TRI, and 140 in DMR) 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. |                                                                                                  |                                                    |          |                                                    |          |                                   |           |
| <sup>g</sup> The central tendency values for NEI air were calculated using the median of the reported releases at each site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                  |                                                    |          |                                                    |          |                                   |           |
| <sup>h</sup> These central tendency and high-end releases appear equivalent in the table due to rounding.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                  |                                                    |          |                                                    |          |                                   |           |

## 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, 2025e](#)), 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 for each COU/OES the evaluated environmental media pathways 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 or estimated releases using AERMOD, as detailed in the 1,2-dichloroethane media concentrations assessment TSD ([U.S. EPA, 2025e](#)). 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. Additionally, HEM (see also Sections 3.2.1 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. HEM also provides data that characterizes the exposed population. Modeled exposures from AERMOD and HEM were then used to calculate acute, chronic non-cancer, and cancer risks via the ambient air pathway, as outlined in the 1,2-dichloroethane draft risk evaluation ([U.S. EPA, 2025i](#)).

The Agency used facility-reported and EPA-estimated releases of 1,2-dichloroethane to surface water together with flow metrics of the receiving waterbody 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 waterbodies and the corresponding stream flow metrics from the NHDPlus2 ([U.S. EPA, 2016](#)) suite of geospatial data sets. 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, 2025e](#)). This draft 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).

276

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

| COU/<br>OES                                                                                                                                                                                                                                                                                                                                                                                       | Exposure<br>Route | Media/<br>Exposure<br>Pathway | Exposure Scenario                                                                                           | Populations/<br>Lifestage (Age) <sup>a</sup> | Analysis<br>(Quantitative or<br>Qualitative) and<br>TSD Section |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| All                                                                                                                                                                                                                                                                                                                                                                                               | Inhalation        | Ambient<br>air                | Inhalation exposure to 1,2-dichloroethane in ambient air from all reported and modeled releases             | All                                          | Quantitative,<br>Section 3                                      |
| All                                                                                                                                                                                                                                                                                                                                                                                               | Oral              | Drinking<br>water             | Ingestion of 1,2-dichloroethane in drinking water from releases to surface receiving waters                 | All                                          | Quantitative,<br>Section 4.1                                    |
| All                                                                                                                                                                                                                                                                                                                                                                                               | Oral              | Surface<br>water              | Dermal exposure to 1,2-dichloroethane in surface water during swimming from facility-specific releases      | Adults and children (6+ years)               | Quantitative,<br>Section 4.2                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                   | Dermal            |                               | Incidental ingestion of 1,2-dichloroethane in surface water during swimming from facility-specific releases | Adults and children (6+ years)               | Quantitative,<br>Section 5                                      |
| All                                                                                                                                                                                                                                                                                                                                                                                               | Oral              | Fish<br>ingestion             | Ingestion of fish exposed to 1,2-dichloroethane in receiving water for general population                   | Adults and young toddlers (1–2 years old)    | Quantitative,<br>Section 4.4                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                   | Oral              |                               | Ingestion of fish for subsistence fishers                                                                   | Adults (16 to <70 years)                     | Quantitative,<br>Section 4.4                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                   | Oral              |                               | Ingestion of fish for Tribal populations                                                                    | Adults (16 to <70 years)                     | Quantitative,<br>Section 4.4                                    |
| All                                                                                                                                                                                                                                                                                                                                                                                               | Oral              | Biosolids                     | Ingestion of 1,2-dichloroethane via soils amended with land applied biosolids                               | Children (3–6 years)                         | Qualitative,<br>Section 4.3                                     |
| All                                                                                                                                                                                                                                                                                                                                                                                               | Oral              | Air<br>deposition             | Ingestion of 1,2-dichloroethane via soils                                                                   | Children (3–6 years)                         | Qualitative,<br>Section 4.3                                     |
| COU = condition of use; OES = occupational exposure scenario; TSD = technical support document<br><sup>a</sup> Inhalation exposures are based on 1,2-dichloroethane ambient air concentrations at radial distances from the point of release. EPA compares to the hazard value that is also expressed as chemical concentration in air but does not estimate inhalation by dose or by life stage. |                   |                               |                                                                                                             |                                              |                                                                 |

277

### 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, 2025e](#)). 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, disposal, and treatment (Incinerator); Waste handling, disposal, and treatment (Landfill); Waste handling, disposal, and treatment (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, 2025m](#)), 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 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) HEM, which conducts dispersion modeling using AERMOD as a compiled executable program. AERMOD was used to estimate exposures using a multi-year analysis (2015–2021) for releases from TRI reporting facilities, NEI reporting facilities, and generic facilities/sites (Section 3.1). HEM was run as a supplement to AERMOD because it provides data on exposed populations that is essential when considering risks (Section 3.2). The method for calculating exposures using exclusively AERMOD-modeled ambient air concentrations is slightly different from the method used within HEM; both methods are described in this section.

#### 3.1 AERMOD Modeling Approach

---

AERMOD was used to model ambient air concentrations at eight discrete distances and two area distances (see *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)) for a description of area distances) ranging from 10 m to 10 km from facilities reporting releases to TRI for the 2015 to 2021 reporting years for 5 OESs, and to NEI for the 2014 and 2017 reporting years for 10 OESs. AERMOD was also used to model ambient air concentrations for five OESs with estimated releases ([U.S. EPA, 2025h](#)). 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 *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)), *Draft Supplemental Information on AERMOD TRI Exposure and Risk Analysis for 1,2-Dichloroethane* ([U.S. EPA, 2025l](#)), *Draft Supplemental Information on AERMOD Generic Releases Exposure and Risk Analysis for 1,2-Dichloroethane* ([U.S. EPA, 2025j](#)), and *Draft Supplemental Information on AERMOD NEI Exposure and Risk Analysis for 1,2-Dichloroethane* ([U.S. EPA, 2025k](#)).

### 3.1.1 Exposure Estimates

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, 2025e](#)). 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 <sup>3</sup> )                                                                                         |
| LADC | = | Lifetime average daily concentration (µg/m <sup>3</sup> )                                                                        |
| DAC  | = | Daily average air concentration, model output reflecting average concentrations over a 24-hour period (µg/m <sup>3</sup> )       |
| ET   | = | Exposure time (24 hours/day)                                                                                                     |
| AAC  | = | Annual average air concentration, model output reflecting average concentrations over a year (µg/m <sup>3</sup> )                |
| 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 Science Advisory Committee on Chemicals ([SACC](#); accessed August 13, 2025) ([U.S. EPA, 2023b](#)).

## 3.2 HEM Modeling Approach

HEM version 4.2 was used to model exposures and risks using TRI Form R<sup>1</sup> reporting releases for the 2018 reporting year and 2020 U.S. Census data. The 2018 reporting year was chosen for HEM modeling because it had the highest overall releases from 2015 to 2021; therefore, the exposures calculated from

<sup>1</sup> Facilities do not need to report release quantities or uses/sub-uses on Form A. See TRI Program Guidance on [EPA's GuideME](#) website (accessed July 1, 2025) under Reporting Forms and Instructions.

HEM represent higher-end exposure scenarios. For TRI Form R reporting facilities that did not report in 2018, the highest release from 2015 to 2021 was used. NEI-reported releases were not modeled because the largest releasing facilities were included in the TRI dataset. Estimated releases for generic facilities/sites were also not modeled using HEM as generic facilities/sites do not have specific locations that can be used for population analyses. Because HEM estimates exposure and risk as part of its algorithm and was used primarily for population analysis, EPA is not showing the inhalation exposures modeled by HEM in this TSD.

HEM has two components: (1) an atmospheric dispersion model, AERMOD<sup>2</sup>, which includes meteorological data; and (2) U.S. Census Bureau population data at the block level. HEM version 4.2 uses 2020 Census data—including all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.<sup>3</sup> AERMOD estimates the magnitude and distribution of chemical concentrations in ambient air in the vicinity of each releasing facility within a user-defined radial distance out to 50 km. HEM also provides chemical concentrations in ambient air at the centroid of over 8 million census blocks across the United States. HEM automatically uses local meteorological data within AERMOD's "AERMET-sub-module" and topographic information for each release point to inform the release dispersion model. A full description of the HEM method is described in Section 3.2.1. See the HEM 4.2 User Guide<sup>4</sup> for more details ([SC&A, 2023](#)).

### 3.2.1 HEM Settings

As mentioned above, EPA used release data reported to TRI and release location data reported to NEI ([U.S. EPA, 2025f](#)) to estimate exposures and risks using HEM. For facilities reporting to both NEI and TRI, the Agency defaulted to using the highest reported release location from NEI as the modeled release location. EPA used release location data from NEI because several facility locations reported to TRI appeared to be street addresses that were not representative of the actual release location. EPA used release location data reported to NEI as a systematic way to refine release locations to more accurately represent releases as NEI data provide process-specific release locations. If a facility did not report to NEI, the Agency used the release location reported to TRI; however, for EPA did verify that the location of these releases appeared to be on the facility property. For HEM analysis, EPA only modeled the five OESs (Manufacturing; Processing as a reactant; Processing into formulation, mixture, or reaction product; Repackaging; and Waste handling, disposal, and treatment) for which there were reported TRI releases. The model was run using fugitive and stack emissions. For facilities reporting both types of emissions, modeled concentrations from both types were added together to determine a total exposure. Additionally, one facility (TRI ID 77541THDBUILD) had two separate data entries in the TRI database for different NAICS codes. The two entries were modeled separately; however, because the facility was assigned one OES, the resulting concentrations and exposures were added for use in this analysis.

Table 3-1 presents the values and settings used in the HEM "facility list" input file. Table 3-2 and Table 3-3 provide additional information on those values and settings. As shown in Table 3-1, the model automatically matches a meteorology station to each facility by proximity. The meteorological dataset contains over 800 stations nationwide, most of which reflect 2019 meteorological conditions. HEM automatically determines if the facility is in an urban location using 2020 census data. EPA assumed that all facilities release emissions 24-hours a day. HEM calculated risks using a cancer unit risk estimate, equivalent to the inhalation unit risk (IUR) used in this evaluation, of  $7.1 \times 10^{-6}$  risk per  $\text{m}^3/\mu\text{g}$ .

<sup>2</sup> See [website for AERMOD](#) (accessed July 1, 2025).

<sup>3</sup> Note that 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.

<sup>4</sup> See the [HEM 4.2 User Guide](#) (accessed July 1, 2025).

409 **Table 3-1. Settings for “Facility List” Input File in HEM**

| Parameter Group                     | Parameter    | Value or Setting                                   | Interpretation                                                                                                                                                                                                                                                                              |
|-------------------------------------|--------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dispersion Environment              | met_station  | [blank]                                            | Model chose the meteorology station closest to each facility                                                                                                                                                                                                                                |
|                                     | rural_urban  | [blank]                                            | Model found the nearest census block to the facility center and determined whether that block was located in an urbanized area as designated by the 2020 Census                                                                                                                             |
|                                     | urban_pop    | [blank]                                            | Model used a default of 50,000 people for the urban population                                                                                                                                                                                                                              |
| Modeling Domain Defined             | max_dist     | 50,001                                             | Model used a default of 50,000 m to define the modeling domain around each facility (entering 50,001 forces a default of 50,000)                                                                                                                                                            |
|                                     | model_dist   | 50,001                                             | Model used a default of 3,000 m to define the cutoff distance around each facility for explicitly modeling census block receptors; modeling results for block receptors beyond 3,000 meters were interpolated from polar receptors (entering 50,001 forces a default of 3,000) <sup>a</sup> |
|                                     | radials      | 16                                                 | Model used polar receptors at the default of 16 radials                                                                                                                                                                                                                                     |
|                                     | Circles      | 8                                                  | Model used polar receptors at 8 concentric rings                                                                                                                                                                                                                                            |
|                                     | overlap_dist | 30                                                 | Model used a default 30 m to define the facility fenceline, inside which receptors were not considered as a point of maximum exposure/risk                                                                                                                                                  |
|                                     | ring1        | 10                                                 | Model used 10 m for the distance of the first ring of polar receptors                                                                                                                                                                                                                       |
|                                     | fac_center   | L, [custom for each facility: latitude, longitude] | Model used the facility latitude and longitude from TRI                                                                                                                                                                                                                                     |
|                                     | ring_dists   | 10, 30, 60, 100, 1,000, 2,500, 5,000, 10,000 m     | Model used concentric rings of polar receptors at these distances                                                                                                                                                                                                                           |
| Acute Options                       | Acute        | Y                                                  | Model calculated short-term concentrations                                                                                                                                                                                                                                                  |
|                                     | hours        | 24                                                 | Model defined “short-term” as 24 hours ( <i>i.e.</i> , daily)                                                                                                                                                                                                                               |
|                                     | multiplier   | 1                                                  | Model used the hourly emissions as-is, without multiplying them by a factor that would approximate short-term emission rates above baseline                                                                                                                                                 |
|                                     | high_value   | 18                                                 | Model reports the 18th-highest acute concentration at each receptor (this approximates the 95th-percentile daily concentration)                                                                                                                                                             |
| Deposition and Depletion Parameters | dep          | [blank]                                            | Model did not estimate deposition <sup>b</sup>                                                                                                                                                                                                                                              |
|                                     | depl         | [blank]                                            |                                                                                                                                                                                                                                                                                             |
|                                     | pdep         | [blank]                                            |                                                                                                                                                                                                                                                                                             |
|                                     | pdepl        | [blank]                                            |                                                                                                                                                                                                                                                                                             |
|                                     | vdep         | [blank]                                            |                                                                                                                                                                                                                                                                                             |
|                                     | vdepl        | [blank]                                            |                                                                                                                                                                                                                                                                                             |
| Additional Options                  | elev         | Y                                                  | Model included the elevation of receptors in the concentration estimates                                                                                                                                                                                                                    |
|                                     | user_rcpt    | N                                                  | Model did not use additional receptors beyond polar rings and census blocks                                                                                                                                                                                                                 |
|                                     | bldg_dw      | N                                                  | Model did not estimate building downwash, which is the default choice                                                                                                                                                                                                                       |
|                                     | fastall      | Y                                                  | Model used AERMOD’s FASTALL option to conserve model run time by simplifying the dispersion algorithms, which is not the default choice                                                                                                                                                     |

| Parameter Group                                                                                                                                                                                                 | Parameter    | Value or Setting | Interpretation                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------|-------------------------------------------------------------------------------------------------------------------------|
| Additional Options                                                                                                                                                                                              | emiss_var    | Y                | Model used time-varying emissions, specified in a separate file <sup>c</sup>                                            |
|                                                                                                                                                                                                                 | annual       | Y                | Model used the default setting to calculate an annual average as a long-term concentration, which is the default choice |
|                                                                                                                                                                                                                 | period_start | [blank]          |                                                                                                                         |
|                                                                                                                                                                                                                 | period_end   | [blank]          |                                                                                                                         |
| <sup>a</sup> For a small number of facilities, because there were no populated block centroids within 3,000 m of the facility, this distance was set to a value needed to capture populated blocks (Table 3-2). |              |                  |                                                                                                                         |
| <sup>b</sup> Air deposition was estimated using AERMOD as a standalone program (see media concentrations TSD ( <a href="#">U.S. EPA, 2025e</a> ))                                                               |              |                  |                                                                                                                         |
| <sup>c</sup> Separate file used AERMOD’s MHRDOW7 format allowing emission rates to vary by month, hour of day, and 7 days of the week (see Table 3-3).                                                          |              |                  |                                                                                                                         |

**Table 3-2. Substitutions Made for the Facility List File's "Model\_Distmodel\_dist" Parameter in HEM**

| Facility ID     | Model_Distance (m) |
|-----------------|--------------------|
| 97812CHMCL17629 | 4,145              |
| 84029SFTYK11600 | 21,021             |
| 77536SFTYK2027B | 4,514              |
| 79086DMNDSSTARR | 4,666              |
| 77571LPRTC2400M | 4,522              |
| 77541TXSBR4115E | 6,150              |
| 77536DSPSL2525B | 4,157              |
| 77643WSTMNHWY73 | 4,595              |

**Table 3-3. Assumptions for Interday Emission-Release Pattern Using HEM**

| Days per Year of Emissions | Implemented Release Pattern: Days When Emissions Are on                                                                               |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 250                        | Monday–Friday, except no Fridays in October–December = 248 days/year as implemented<br>Emission factor when emissions on = 1.474.     |
| 300                        | Monday–Saturday, except no Saturdays in October–December = 300 days/year as implemented<br>Emission factor when emissions on = 1.219. |
| 350                        | All days, except no Sundays in September–December = 347 days/year as implemented<br>Emission factor when emissions on = 1.05.         |
| 365                        | All days.<br>Emission factor when emissions on = 1.                                                                                   |

Each census block receptor within 3,000 m of each facility was discretely modeled, with some exceptions noted in the tables below, while block receptors out to 50,000 m were interpolated using

dispersion modeling results from the polar receptor network. All modeling scenarios also used several concentric rings of non-census polar receptors.

Table 3-4 shows the physical source specifications used in the HEM “emission location” input file for point (stack) and area (fugitive) sources; these are the same default physical parameters as in EPA’s Integrated Indoor-Outdoor Air Calculator (IIOAC).<sup>5</sup> The IIOAC User’s Guide describes how these default values were selected.

**Table 3-4. Physical Source Specifications for HEM**

| Source Type     | Parameter                     | Value |
|-----------------|-------------------------------|-------|
| Point (stack)   | Stack height (m)              | 10    |
|                 | Inside stack diameter (m)     | 2     |
|                 | Exit gas velocity (m/s)       | 5     |
|                 | Exit gas temperature (Kelvin) | 300   |
| Area (fugitive) | Release height (m)            | 3.05  |
|                 | Length (m)                    | 10    |
|                 | Width (m)                     | 10    |
|                 | Angle (degrees)               | 0     |

### 3.2.2 Aggregate and Demographic Model Outputs

Risk summary reports in HEM were run to produce outputs that account for impacts on the same receptor from multiple neighboring facilities. The general population characterization, which summarizes modeled impacts by various socioeconomic factors, was also run.

### 3.2.3 Inhalation Exposure Estimates for Fenceline Communities

Exposures are calculated as part of the HEM output; therefore, EPA did not need to calculate exposures externally to HEM, as was needed for concentrations modeled using AERMOD as a stand-alone program. The overall method used in HEM for calculating exposures is similar to the method described above but is slightly more comprehensive as HEM aggregates exposures across all releasing facilities. Additionally, when modeling exposures using HEM, 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, 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 air exposure, the analysis focuses on general population exposures that might occur within 10 km of releasing facilities for releases modeled using AERMOD and 50 km for releases modeled using HEM. EPA calculated 10th, 50th, 95th percentile ACs, ADCs, and LADCs at each radial distance for each facility, up to 10 km from releasing facilities, based on AERMOD modeled air concentrations. 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 *Draft Supplemental Information on AERMOD TRI Exposure and Risk Analysis for 1,2-Dichloroethane* ([U.S. EPA, 2025i](#)), *Draft Supplemental Information on AERMOD Generic Releases Exposure and Risk Analysis for 1,2-Dichloroethane* ([U.S. EPA, 2025j](#)), and *Draft Supplemental Information on AERMOD NEI Exposure*

<sup>5</sup> See [IIOAC website](#) (accessed August 13, 2025).

and Risk Analysis ([U.S. EPA, 2025k](#)).

### 3.3.1 Ambient Air Exposure using AERMOD Modeled Concentrations

---

For each facility reporting to TRI and NEI, a 95th percentile LADC was estimated at each modeled distance. The highest LADCs at each distance for each OES based on TRI and NEI reported releases are presented in Table 3-5 and Table 3-6, respectively. The LADCs presented in Table 3-6 for NEI reporting facilities exclude facilities identified as municipal solid waste landfills.

Overall, for TRI reporting facilities, the Manufacturing OES had the highest estimated exposures with a maximum 95th modeled exposure of  $3,680 \mu\text{g}/\text{m}^3$  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  $6.4 \mu\text{g}/\text{m}^3$  at a distance of 1,000 m is more representative of general population exposure. Across all OES higher exposures occur at distances nearer to the release location and decrease as the distance increases.

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  $4.6 \mu\text{g}/\text{m}^3$  at a distance of 1,000 m is more representative of general population exposure, which is similar to what was estimated when using the TRI releases.

NEI reported emissions from municipal solid waste landfills were considered separately in this assessment because the emissions from this category of facilities could not be directly attributed to a TSCA COU ([U.S. EPA, 2025e, h](#)). The LADCs presented in Table 3-7 are for emissions from municipal solid waste landfills and are based on the maximum 95th percentile annual average air concentrations estimated across all facilities reporting to NEI within each OES identified as solid waste landfills. Estimated lifetime exposures across all distances evaluated range from  $1.93 \times 10^{-4}$  to  $26 \mu\text{g}/\text{m}^3$ .

Table 3-8 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 greater than or equal to 1,000 m, estimated lifetime exposures range from  $1.6 \times 10^{-4}$  to  $36 \mu\text{g}/\text{m}^3$ .

The complete set of inhalation exposure estimates is presented in the *Draft Supplemental Information on AERMOD TRI Exposure and Risk Analysis for 1,2-Dichloroethane* ([U.S. EPA, 2025l](#)), *Draft Supplemental Information on AERMOD NEI Exposure and Risk Analysis* ([U.S. EPA, 2025j](#)), and *Draft Supplemental Information on AERMOD Generic Releases Exposure and Risk Analysis* ([U.S. EPA, 2025j](#)).

**Table 3-5. Maximum 95th Percentile Lifetime Average Daily Ambient Air Concentrations for 1,2-Dichloroethane Releases Reported to TRI from 2015–2020 Modeled Using AERMOD as a Standalone Program<sup>a b</sup>**

| Occupational Exposure Scenario (OES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Number of Facilities Evaluated in OES | Statistic | 95th Percentile Lifetime Average Daily Ambient Air Concentration (µg/m <sup>3</sup> ) 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 |
| Manufacturing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 24                                    | max       | 3,680                                                                                                                                                   | 1,510 | 1,030    | 606      | 282      | 39          | 6.4      | 1.5      | 0.48     | 0.16     |
| Repackaging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 12                                    | max       | 22                                                                                                                                                      | 10    | 7.0      | 4.4      | 2.2      | 0.22        | 5.26E–02 | 1.12E–02 | 3.50E–03 | 1.09E–03 |
| Processing as a reactant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 12                                    | max       | 37                                                                                                                                                      | 14    | 9.3      | 5.5      | 2.6      | 0.33        | 6.64E–02 | 1.71E–02 | 6.31E–03 | 2.36E–03 |
| Processing into formulation, mixture, or reaction product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 12                                    | max       | 456                                                                                                                                                     | 173   | 130      | 68       | 30       | 4.5         | 0.61     | 0.13     | 4.35E–02 | 1.45E–02 |
| Non-aerosol cleaning and degreasing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1                                     | max       | 0.20                                                                                                                                                    | 0.12  | 7.37E–02 | 4.90E–02 | 2.28E–02 | 3.73E–03    | 8.40E–04 | 2.22E–04 | 7.89E–05 | 2.75E–05 |
| Waste handling, disposal, and treatment (Incinerator)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 18                                    | max       | 15                                                                                                                                                      | 7.1   | 4.8      | 3.0      | 1.5      | 0.18        | 4.17E–02 | 1.10E–02 | 4.15E–03 | 1.53E–03 |
| <p>AERMOD = American Meteorological Society/Environmental Protection Agency Regulatory (Model); TRI = Toxics Release Inventory</p> <p><sup>a</sup> The full inputs and results are presented in the <i>Draft Supplemental Information on AERMOD TRI Exposure and Risk Analysis for 1,2-Dichloroethane</i> (<a href="#">U.S. EPA, 2025l</a>).</p> <p><sup>b</sup> For each OES, EPA modeled all TRI-reporting releases considering source attribution (fugitive and stack releases) for each facility from 2015 to 2020. Not all facilities reported for all 6 years.</p> |                                       |           |                                                                                                                                                         |       |          |          |          |             |          |          |          |          |

494  
495

**Table 3-6. Maximum 95th Percentile Lifetime Average Daily Ambient Air Concentrations for 1,2-Dichloroethane Releases Reported to NEI for the Reporting Years of 2014 and 2017 Modeled Using AERMOD as a Standalone Program<sup>a b c</sup>**

| Occupational Exposure Scenario (OES)                      | Number of Releases Evaluated in OES | Statistic | 95th Percentile Lifetime Average Daily Concentrations (µg/m <sup>3</sup> ) 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 |
| Manufacturing                                             | 439                                 | max       | 5,120                                                                                                                                        | 1,660    | 1,110    | 562      | 234      | 32          | 4.6      | 1.0      | 0.32     | 0.10     |
| Repackaging                                               | 1,093                               | max       | 22                                                                                                                                           | 11       | 6.0      | 3.9      | 1.7      | 0.88        | 0.11     | 2.22E-02 | 7.32E-03 | 2.39E-03 |
| Processing as a reactant                                  | 127                                 | max       | 158                                                                                                                                          | 60       | 41       | 34       | 33       | 3.8         | 0.56     | 0.12     | 3.78E-02 | 1.29E-02 |
| Processing into formulation, mixture, or reaction product | 76                                  | max       | 238                                                                                                                                          | 247      | 193      | 122      | 62       | 6.3         | 1.6      | 0.33     | 0.10     | 3.09E-02 |
| Industrial application adhesives and sealants             | 419                                 | max       | 1.2                                                                                                                                          | 17       | 13       | 6.2      | 2.7      | 0.34        | 5.47E-02 | 1.20E-02 | 3.73E-03 | 1.23E-03 |
| Industrial application of lubricants and greases          | 6                                   | max       | 3.66E-03                                                                                                                                     | 1.24E-03 | 7.76E-04 | 4.70E-04 | 2.07E-04 | 1.88E-05    | 4.01E-06 | 8.38E-07 | 2.59E-07 | 8.22E-08 |
| Non-aerosol cleaning and degreasing                       | 53                                  | max       | 22                                                                                                                                           | 7.0      | 4.6      | 2.6      | 1.2      | 0.10        | 2.63E-02 | 7.49E-03 | 2.64E-03 | 8.81E-04 |
| Laboratory use                                            | 9                                   | max       | 1.1                                                                                                                                          | 0.83     | 1.1      | 1.0      | 0.71     | 0.11        | 2.47E-02 | 5.50E-03 | 1.76E-03 | 5.65E-04 |
| Waste handling, disposal, and treatment (incinerator)     | 103                                 | max       | 41                                                                                                                                           | 8.5      | 5.4      | 2.9      | 1.2      | 0.14        | 2.25E-02 | 4.62E-03 | 1.43E-03 | 4.63E-04 |
| Waste handling, disposal, and treatment (landfill)        | 147                                 | max       | 8.2                                                                                                                                          | 2.4      | 1.9      | 0.89     | 0.37     | 5.28E-02    | 1.02E-02 | 2.61E-03 | 8.70E-04 | 2.83E-04 |
| Waste handling, disposal, and treatment (non-POTW WWT)    | 68                                  | max       | 6.2                                                                                                                                          | 6.4      | 4.7      | 2.3      | 0.98     | 0.12        | 2.15E-02 | 5.00E-03 | 1.68E-03 | 5.51E-04 |
| Waste handling, disposal, and treatment (POTW)            | 68                                  | max       | 19                                                                                                                                           | 7.4      | 5.1      | 3.0      | 1.5      | 0.19        | 3.71E-02 | 8.22E-03 | 2.66E-03 | 8.61E-04 |
| Waste handling disposal, and treatment (remediation)      | 45                                  | max       | 3.0                                                                                                                                          | 0.94     | 0.65     | 0.34     | 0.18     | 0.14        | 9.47E-02 | 3.44E-02 | 1.33E-02 | 4.69E-03 |
| Facilities not mapped to and OES <sup>d</sup>             | 115                                 | max       | 9.9                                                                                                                                          | 3.8      | 2.6      | 1.5      | 0.69     | 8.53E-02    | 1.46E-02 | 3.72E-03 | 1.82E-03 | 8.23E-04 |

AERMOD = American Meteorological Society/Environmental Protection Agency Regulatory (Model); NEI = National Emissions Inventory; POTW = publicly owned treatment works; WWT = wastewater treatment

<sup>a</sup> The full inputs and results are presented in the *Draft Supplemental Information on AERMOD NEI Exposure and Risk Analysis* ([U.S. EPA, 2025k](#))

<sup>b</sup> For each OES, EPA modeled all NEI-reporting releases considering source attribution (fugitive and stack releases) for each facility for the 2014 and 2017 reporting years. Not all facilities reported in both years.

<sup>c</sup> Facilities reporting to NEI with the NAICS code of 562212, which is for solid waste landfills, were not included in this analysis (see Table 3-7 for data for landfills) because the releases were assumed to be due to biodegradation of other chlorinated solvents.

<sup>d</sup> Facilities were not mapped to an OES in cases where information on the 1,2-dichloroethane use at the site was not available.

**Table 3-7. Maximum 95th Percentile Lifetime Average Daily Concentrations for 1,2-Dichloroethane Releases Reported to NEI for Municipal Solid Waste Landfills for the Reporting Years of 2014 and 2017 Modeled Using AERMOD as a Standalone Program<sup>a b c</sup>**

| Occupational Exposure Scenario (OES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Number of Releases Evaluated in OES <sup>b</sup> | Statistic | 95th Percentile Lifetime Average Daily Concentrations (µg/m <sup>3</sup> ) Estimated at Distances from 10 to 10,000 m from Releasing Facilities <sup>b</sup> |      |         |      |          |             |          |          |          |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|------|----------|-------------|----------|----------|----------|----------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                  |           | 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 |
| Application of lubricants and greases <sup>d</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                | max       | 4.6                                                                                                                                                          | 2.9  | 1.9     | 1.0  | 0.43     | 5.8E-02     | 8.5E-03  | 1.9E-03  | 5.9E-04  | 1.9E-04  |
| Waste handling, disposal, and treatment (incinerator) <sup>d</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2                                                | max       | 1.6                                                                                                                                                          | 0.72 | 0.52    | 0.29 | 0.14     | 2.00E-02    | 3.15E-03 | 6.86E-04 | 2.17E-04 | 6.91E-05 |
| Waste handling, disposal, and treatment (landfill)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 751                                              | max       | 26                                                                                                                                                           | 11   | 6.8     | 4.4  | 2.1      | 0.20        | 4.9E-02  | 1.1E-02  | 3.4E-03  | 1.1E-03  |
| Waste handling, disposal, and treatment (non-POTW WWT) <sup>d</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 20                                               | max       | 0.12                                                                                                                                                         | 0.12 | 0.12    | 0.10 | 2.19E-02 | 3.33E-03    | 8.55E-04 | 1.96E-04 | 6.25E-05 | 2.02E-05 |
| Waste handling, disposal, and treatment (remediation) <sup>d</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 12                                               | max       | 2.3                                                                                                                                                          | 0.73 | 0.52    | 0.29 | 0.14     | 1.86E-02    | 3.32E-03 | 7.13E-04 | 2.32E-04 | 7.66E-05 |
| <p>AERMOD = American Meteorological Society/Environmental Protection Agency Regulatory (Model); NEI = National Emissions Inventory; POTW = publicly owned treatment works; WWT = wastewater treatment</p> <p><sup>a</sup> The full inputs and results are presented in the <i>Draft Supplemental Information on AERMOD NEI Exposure and Risk Analysis</i> (<a href="#">U.S. EPA, 2025k</a>).</p> <p><sup>b</sup> For each OES, EPA modeled all NEI-reporting releases considering source attribution (fugitive and stack releases) for each facility for the 2014 and 2017 reporting years. Not all facilities reported in both years.</p> <p><sup>c</sup> Only facilities reporting to NEI with the NAICS code of 562212, which is for solid waste landfills, were included in this analysis. Results for solid waste landfills are being showing separately because the releases were assumed to be due to biodegradation of other chlorinated solvents (<a href="#">U.S. EPA, 2025f</a>).</p> <p><sup>d</sup> Facilities mapped to these OESs reported a NAICS code of 562212 and were treated as landfill for the ambient air analysis, despite not being assigned to the OES of Waste handling, disposal, and treatment (landfill).</p> |                                                  |           |                                                                                                                                                              |      |         |      |          |             |          |          |          |          |

**Table 3-8. 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 <sup>a b</sup>**

| Occupational Exposure Scenario (OES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Meteorology <sup>c</sup> | Land  | 95th Percentile Lifetime Average Daily Concentrations (µg/m <sup>3</sup> ) 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                                                                                                                                         | 0.17  | 10.0E–02 | 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  | 10.0E–02 | 5.0E–02 | 1.9E–02 | 1.6E–03     | 1.6E–04 | 2.6E–05 | 8.4E–06 | 3.5E–06  |
| <p>AERMOD = American Meteorological Society/Environmental Protection Agency Regulatory (Model)</p> <p><sup>a</sup> The full inputs and results are presented in the <i>Draft Supplemental Information on AERMOD Generic Releases Exposure and Risk Analysis</i> (<a href="#">U.S. EPA, 2025j</a>)</p> <p><sup>b</sup> See <i>Draft Environmental Release Assessment for 1,2-Dichloroethane</i> (<a href="#">U.S. EPA, 2025f</a>) for the methods used for to estimate releases for OESs where there were either no or limited site-specific data.</p> <p><sup>c</sup> 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 station in IIOAC.</p> |                          |       |                                                                                                                                              |       |          |         |         |             |         |         |         |          |

### 3.3.2 HEM Modeling Results by U.S. Census Block

---

As described in Section 3.2.1, HEM provides cancer risk estimates at the census block level. HEM 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 HEM cancer risk estimates at the census block level, see 1,2-dichloroethane draft risk evaluation ([U.S. EPA, 2025i](#)).

## 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 3.2.3), release data by OES used as model input data ([U.S. EPA, 2025e, f](#)), and agreement between modeled and monitored ambient air concentrations ([U.S. EPA, 2025e](#)).

### Releases

EPA identified five OESs with only facility-reported releases of 1,2-dichloroethane to the ambient air (Manufacturing; Repackaging; Processing as a reactant; Processing into formulation, mixture, or reaction product; and Waste handling disposal and treatment). 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. The remaining three OESs evaluated had both facility-reported and modeled releases (Industrial application of lubricants and greases; Industrial application of adhesives and sealants; Non-aerosol cleaning and degreasing; and Laboratory use) (Table 3-9) ([U.S. EPA, 2025f](#)).

EPA has robust confidence in the representativeness of facility-reported releases reported to TRI and NEI for all but one OES. The exception is a subset of facility-reported releases to NEI in the Waste handling, treatment, and disposal OES. These facilities are non-hazardous landfills and are considered separately, see Section 3.3.1, *Draft Environmental Release Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025f](#)), and *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)) for additional discussion. EPA has slight confidence in this subset of reported releases because the source of 1,2-dichloroethane in landfills could not be attributed to a TSCA COU. The Agency has slight to moderate confidence that the EPA estimated releases from generic facilities/sites are representative of actual releases ([U.S. EPA, 2025f](#)). Overall, the confidence in the release data is dependent on the OES and ranges from slight to robust (Table 3-9). Refer to the *Draft Environmental Release Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025f](#)) 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 HEM 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. Although HEM was used to model ambient air concentrations at user-defined distances, the results are not presented in this evaluation due to the limited release years that were modeled, and because the results would duplicate the comprehensive modeling done using AERMOD as a standalone model (for both facility-reported releases and releases estimated for generic facilities/sites for all reporting years evaluated in this assessment). AERMOD has been peer reviewed as part of the regulatory model process described in Appendix W to 40 CFR part 51. HEM is a model developed by EPA's Office of Air and Radiation (OAR) that runs AERMOD as a compiled executable program to model ambient air concentrations. Both HEM and AERMOD are used in a fit for purpose manner for this 1,2-dichloroethane draft risk evaluation, and their use is supported by robust confidence.

***Release Site Physical Characteristics Input Data***

For 10 of the OESs/COUs evaluated in this draft assessment, EPA had site-specific, facility-reported releases available for use as direct inputs to AERMOD and HEM. 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 HEM 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 *Draft Environmental Release Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025f](#)). Therefore, EPA 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 which are supported by slight to moderate evidence (Table 3-9).

***Comparison of Modeled and Monitored Data***

EPA performed a detailed comparison of modeled and monitored data for a facility in Calvert City, Kentucky. The comparison showed that the modeled 95th percentile average daily concentrations and the maximum 1-day monitored 1,2-dichloroethane concentrations from the AMTIC archive were within an order of magnitude of each other when the monitoring location was within 300 m of the modeled distance. 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 *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)) for more details.

***Exposure Scenarios and Exposure Factors***

For this analysis, EPA 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 potentially exposed or susceptible subpopulation (PESS) groups and communities that are located near releasing facilities. It is also consistent with previous recommendations from the Science Advisory Committee on Chemicals ([SACC](#); accessed August 13, 2025) ([U.S. EPA, 2023b](#)). 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 3-9). The overall confidence represents specific considerations within each OES and is not necessarily based on an additive approach considering each individual contributing category.

595

**Table 3-9. Confidence in Each Line of Evidence and Overall Confidence for Each OES**

| Occupational Exposure Scenario (OES)                                | Release Data Type | Releases (Data Source) <sup>a</sup> | Modeling Methodology | Release Site Physical Characteristics Modeling Input | Modeling/Monitoring Comparison | Exposure Factors/Scenarios | Overall Confidence <sup>c</sup> |
|---------------------------------------------------------------------|-------------------|-------------------------------------|----------------------|------------------------------------------------------|--------------------------------|----------------------------|---------------------------------|
| Manufacturing                                                       | TRI               | Robust                              | Robust <sup>b</sup>  | Moderate                                             | Robust                         | Robust                     | Robust                          |
|                                                                     | NEI               | Robust                              | Robust               | Moderate                                             | Robust                         | Robust                     | Robust                          |
| Repackaging                                                         | TRI               | Robust                              | Robust <sup>b</sup>  | Moderate                                             | Robust                         | Robust                     | Robust                          |
|                                                                     | NEI               | Robust                              | Robust               | Moderate                                             | Robust                         | Robust                     | Robust                          |
| Processing as a reactant                                            | TRI               | Robust                              | Robust <sup>b</sup>  | Moderate                                             | Robust                         | Robust                     | Robust                          |
|                                                                     | NEI               | Robust                              | Robust               | Moderate                                             | Robust                         | Robust                     | Robust                          |
| Processing into formulation, mixture, or reaction product           | TRI               | Robust                              | Robust <sup>b</sup>  | 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     | Slight                              | Robust               | Slight                                               | Robust                         | Robust                     | Slight                          |
| Application of lubricants and greases <sup>d</sup>                  | NEI               | Robust                              | Robust               | Moderate                                             | Robust                         | Robust                     | Robust                          |
|                                                                     | EPA-estimated     | Slight                              | Robust               | Slight                                               | Robust                         | Robust                     | Slight                          |
| Commercial aerosol products                                         | EPA-estimated     | Slight                              | Robust               | Slight                                               | Robust                         | Robust                     | Slight                          |
| Non-aerosol cleaning and degreasing                                 | NEI               | Robust                              | Robust               | Moderate                                             | Robust                         | Robust                     | Robust                          |
|                                                                     | EPA-estimated     | Slight                              | Robust               | Slight                                               | Robust                         | Robust                     | Slight                          |
| Laboratory use                                                      | NEI               | Robust                              | Robust               | Moderate                                             | Robust                         | Robust                     | Robust                          |
|                                                                     | EPA-estimated     | Moderate                            | Robust               | Slight                                               | Robust                         | Robust                     | Moderate                        |
| Waste handling, treatment, and disposal (Incinerator) <sup>d</sup>  | TRI               | Robust                              | Robust <sup>b</sup>  | Moderate                                             | Robust                         | Robust                     | Robust                          |
|                                                                     | NEI               | Robust                              | Robust               | Moderate                                             | Robust                         | Robust                     | Robust                          |
| Waste handling, treatment, and disposal (Landfill) <sup>d</sup>     | NEI               | Slight                              | Robust               | Moderate                                             | Robust                         | Robust                     | Slight                          |
| Waste handling, treatment, and disposal (non-POTW WWT) <sup>d</sup> | NEI               | Slight                              | Robust               | Moderate                                             | Robust                         | Robust                     | Slight                          |
| Waste handling, treatment, and disposal (POTW)                      | NEI               | Slight                              | Robust               | Moderate                                             | Robust                         | Robust                     | Slight                          |
| Waste handling, treatment, disposal (Remediation) <sup>d</sup>      | NEI               | Slight                              | Robust               | Moderate                                             | Robust                         | Robust                     | Slight                          |
| Unknown <sup>e</sup>                                                | NEI               | Robust                              | Robust               | Moderate                                             | Robust                         | Robust                     | Robust                          |

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

<sup>a</sup> Confidences ascribed to the release data type are supported by the *Draft Environmental Release Assessment for 1,2-Dichloroethane* (U.S. EPA, 2025f), 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.

<sup>b</sup> Releases modeled using both AERMOD as standalone model and HEM. The HEM results are presented in the draft risk evaluation (U.S. EPA, 2025i).

| Occupational Exposure Scenario (OES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Release Data Type | Releases (Data Source) <sup>a</sup> | Modeling Methodology | Release Site Physical Characteristics Modeling Input | Modeling/ Monitoring Comparison | Exposure Factors/ Scenarios | Overall Confidence <sup>c</sup> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------------|----------------------|------------------------------------------------------|---------------------------------|-----------------------------|---------------------------------|
| <sup>c</sup> The overall confidence represents specific considerations within each OES and is not necessarily based on an additive approach considering each individual contributing category.<br><sup>d</sup> The overall confidences in this table are only representative of the facilities that were not identified as municipal non-hazardous landfills in Table 3-7. EPA has an overall confidence of slight for the exposures estimated for facilities identified as municipal non-hazardous landfills.<br><sup>e</sup> Facilities were not mapped to an OES in cases where information on the 1,2-dichloroethane use at the site was not available. |                   |                                     |                      |                                                      |                                 |                             |                                 |

596

## 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, 2025b](#)) 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 *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)) describes the methodology and results of estimation of surface water concentration from facility-specific releases.

As described in the *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)), 1,2-dichloroethane facility-specific releases are monitored and regulated via NPDES permits; therefore, EPA can estimate concentrations in the receiving water bodies at the point of discharge of facilities reporting releases of 1,2-dichloroethane. EPA uses 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 or MCL—for 1,2-dichloroethane at 5 parts per billion (ppb) because EPA has determined, given present technology and resources, 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 TSCA 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 TSCA reported releases are upstream of a drinking water intake location 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 *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)). As an initial tiering

analysis, the highest receiving water body concentrations across all COUs/OESs was determined as the Manufacturing COU (see *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)) and was included first in the drinking water exposure analysis. 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 *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)) 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 <sub>dw</sub> | = | Drinking water intake rate (adult: 3.219 L/day; infant: 1.106 L/day) |
| RD               | = | Release days (1 day for ADR)                                         |
| CF1              | = | Conversion factor (1.0×10 <sup>-3</sup> 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 <sub>dw</sub> | = | Drinking water intake rate (adult: 0.880 L/day; infant: 0.220 L/day)  |
| ED               | = | Exposure duration (years for ADD and LADD)                            |

687 *RD* = Release days (days/yr for ADD, LADD, and LADC)  
 688 *CF1* = Conversion factor ( $1.0 \times 10^{-3}$  mg/ $\mu$ g)  
 689 *BW* = Body weight (adult 80 kg; infant: 7.83 kg)  
 690 *AT* = Exposure duration (57 years for ADD and LADD)  
 691 *CF2* = Conversion factor (365 days/yr)  
 692

693 Of the 89 facilities reporting releases of 1,2-dichloroethane to surface waters, EPA identified 48 facility  
 694 releases that were associated with possible downstream drinking water intakes. Table 4-1 summarizes  
 695 the drinking water doses for adults and infants from the facility with the highest downstream drinking  
 696 water intake concentration for each COU. The remaining facilities had lower downstream concentrations  
 697 and doses and therefore are not summarized in Table 4-1. All exposure estimates are provided in *Draft*  
 698 *Drinking Water Exposure Estimates for 1,2-Dichloroethane* ([U.S. EPA, 2025d](#)).  
 699

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

| Scenario                                                                                                                                                                                                                                                                                                                                                                                                                                                | Diluted Harmonic Mean Surface Water Concentrations ( $\mu$ g/L) | Diluted 30Q5 Surface Water Concentrations ( $\mu$ g/L) | Adult (21+ years) |                 |                  | Infant (Birth to <1 year) |                 |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------|-------------------|-----------------|------------------|---------------------------|-----------------|------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                 |                                                        | ADR (mg/kg-day)   | ADD (mg/kg-day) | LADD (mg/kg-day) | ADR (mg/kg-day)           | ADD (mg/kg-day) | LADD (mg/kg-day) |
| Manufacturing (KY0003484)                                                                                                                                                                                                                                                                                                                                                                                                                               | 4.6E-03                                                         | 8.6E-03                                                | 3.4E-07           | 4.9E-08         | 3.6E-08          | 1.2E-06                   | 1.2E-07         | 9.1E-08          |
| Processing/ Processing as a reactant (WV0002496)                                                                                                                                                                                                                                                                                                                                                                                                        | 2.7E-04                                                         | 3.7E-04                                                | 1.5E-08           | 2.9E-09         | 2.1E-09          | 5.2E-08                   | 7.4E-09         | 5.4E-09          |
| Processing/ Processing into formulation, mixture, or reaction product (NJ0004952)                                                                                                                                                                                                                                                                                                                                                                       | 6.2E-04                                                         | 1.2E-03                                                | 4.6E-08           | 6.5E-09         | 4.7E-09          | 1.6E-07                   | 1.7E-08         | 1.2E-08          |
| Disposal/ Waste handling, disposal, and treatment (POTW) (CA0048127)                                                                                                                                                                                                                                                                                                                                                                                    | 0.78                                                            | 5.57                                                   | 2.2E-04           | 5.7E-06         | 4.1E-06          | 7.9E-04                   | 1.4E-05         | 1.1E-05          |
| Waste handling and disposal (Incinerator) (OK0040789)                                                                                                                                                                                                                                                                                                                                                                                                   | 30                                                              | 56                                                     | 2.2E-03           | 3.1E-04         | 2.3E-04          | 7.9E-03                   | 8.0E-04         | 5.8E-04          |
| ADC = average daily concentrations; ADD = average daily dose; ADR = acute dose rate; LADD = lifetime average daily dose<br><sup>a</sup> 30Q5 and harmonic mean receiving water flow values used to calculate ADR and ADD.<br>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. |                                                                 |                                                        |                   |                 |                  |                           |                 |                  |

#### 4.1.2 Monitoring Information

1,2-Dichloroethane U.S. drinking water monitoring and occurrence data are presented and described in

detail in the *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#)).

## 4.2 Incidental Ingestion from Swimming

The general population may swim in surface waters (streams and lakes) that could contain 1,2-dichloroethane from facility releases under TSCA COUs. As screening, the highest modeled surface water concentrations included in *Draft Drinking Water Exposure Estimates for 1,2-Dichloroethane* ([U.S. EPA, 2025d](#)) at the point of effluent discharge were used to estimate acute doses (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.<sup>6</sup>

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 OES:

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

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

Where:

|            |   |                                                                             |
|------------|---|-----------------------------------------------------------------------------|
| <i>ADR</i> | = | Acute dose rate (mg/kg-day)                                                 |
| <i>SWC</i> | = | Surface water concentration (µg/L)                                          |
| <i>IR</i>  | = | Daily ingestion rate (adult: 0.092 l/h; youth: 0.152 l/h; child: 0.096 L/h) |
| <i>ET</i>  | = | Exposure time (adult: 3 h/day; youth: 2 h/day; child: 1 h/day)              |
| <i>CF1</i> | = | Conversion factor (1.0×10 <sup>-3</sup> mg/µg)                              |
| <i>BW</i>  | = | 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 modeled concentration presented in the *Draft Drinking Water Exposure Estimates for 1,2-Dichloroethane* ([U.S. EPA, 2025d](#)) and the above equations.

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

| Scenario                             | 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 <sub>POT</sub> (mg/kg-day) | ADR <sub>POT</sub> (mg/kg-day) | ADR <sub>POT</sub> (mg/kg-day) |
| Manufacturing                        | 1.9E03                                          | 1.1E03                     | 6.7E-03                        | 1.4E-02                        | 5.9E-03                        |
| Processing/ Processing as a reactant | 2.1E02                                          | 1.3E02                     | 7.5E-04                        | 1.2E-03                        | 6.6E-04                        |
| Processing/ Processing aid           | 1.2E01                                          | 1.2E01                     | 4.2E-05                        | 6.5E-05                        | 3.7E-05                        |

<sup>6</sup> Louisiana swimming advisories are found at: <https://deq.louisiana.gov/page/fishing-consumption-and-swimming-advisories> (accessed October 16, 2025).

| Scenario                                                                                               | 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 <sub>POT</sub> (mg/kg-day) | ADR <sub>POT</sub> (mg/kg-day) | ADR <sub>POT</sub> (mg/kg-day) |
| Waste handling and disposal/ (POTW)                                                                    | 1.4E03                                          | 5.3E02                     | 4.8E–03                        | 7.4E–03                        | 4.2E–03                        |
| Waste handling and disposal (Incinerator)                                                              | 2.6E03                                          | 1.4E03                     | 9.0E–03                        | 1.4E–02                        | 7.9E–03                        |
| 30Q5 = 30 consecutive days of lowest flow over a 5-year period; ADR = acute dose rate; POT = potential |                                                 |                            |                                |                                |                                |

### 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, 2025e). 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, 2025e).

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, 2025e), which presents the range of calculated soil concentrations corresponding to the emission scenarios considered. The highest estimated 95th percentile soil concentration among all exposure scenarios was for the Manufacturing OES at 30 m from the releasing facility. EPA is considering the highest estimated 95th percentile soil concentrations for this analysis as a high-end screen and is not considering population data at this stage. Annual daily doses of 1,2-dichloroethane for children ingesting soil receiving biosolids were calculate 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 (1.0×10 <sup>-6</sup> kg/mg) |
| BW  | = | Body weight (kg)                               |
| AT  | = | Averaging time (non-cancer: ED × 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  $3.39 \times 10^{-5}$  mg/kg/day. Additionally, at the estimated 1,2-dichloroethane soil concentration of 2.0 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  $1.1 \times 10^{-4}$  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.

## 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 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 toddler aged between 1 and 2 years represents the high-end acute and chronic for this life stage. Cancer exposure (LADD, lifetime average daily dose) and risks were also characterized due to the carcinogenic potential of 1,2-dichloroethane ([U.S. EPA, 2025n](#)). 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 *Draft Fish Ingestion Risk Calculator for 1,2-Dichloroethane* ([U.S. EPA, 2025g](#)). 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 harmonic mean concentrations per COU resulting from the corresponding facility discharges, with modeled BCF (4.4 L/kg).

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. This subset of the general population may be considered representative of PESS.

**Table 4-3. General Population Fish Ingestion Doses by Surface Water Concentration and COU/OES<sup>a</sup>**

| COU/OES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1,2-Dichloroethane<br>Surface Water Harmonic<br>Mean Concentrations<br>(µg/L) | Adult ADR<br>(mg/kg-day) | Young Toddler<br>ADR<br>(mg/kg-day) | Adult LADD<br>(mg/kg-day) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------|-------------------------------------|---------------------------|
| Manufacturing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.1E03                                                                        | 8.7E-03                  | 2.0E-03                             | 6.9E-03                   |
| Processing/Processing as a reactant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.3E02                                                                        | 1.0E-03                  | 2.3E-04                             | 8.0E-04                   |
| Processing/Processing aid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1.2E01                                                                        | 9.5E-05                  | 2.2E-05                             | 7.5E-05                   |
| Waste handling and disposal/POTW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 5.3E02                                                                        | 4.1E-03                  | 9.6E-04                             | 3.3E-03                   |
| POTW (NN0020265 Chinle WWTF) <sup>b c</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 5.2                                                                           | 6.2E-05                  | N/A                                 | 4.9E-05                   |
| Waste handling and disposal/ Incinerator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1.4E03                                                                        | 1.1E-02                  | 2.5E-03                             | 8.6E-03                   |
| ADR = acute dose rate; LADD = lifetime average daily dose; POTW = publicly owned treatment works; WWTF = wastewater treatment facility<br><sup>a</sup> General population fish consumption rate: adult = 0.2775 g/kg-day; young toddler (1 to <2 years) = 0.412 g/kg-day ( <a href="#">U.S. EPA, 2011</a> )<br><sup>b</sup> Tribal fish consumption rate: adult only = 2.7 g/kg-day ( <a href="#">U.S. EPA, 2011</a> )<br><sup>c</sup> 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 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 *Draft Environmental Media Assessment for 1,2-Dichloroethane* ([U.S. EPA, 2025e](#))), 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 TSCA COU activities and releases 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 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 be associated with COUs, EPA evaluates dermal exposures to 1,2-dichloroethane in this assessment.

### 5.1 Modeling Approach

Modeled estimates of surface water concentrations also were used to estimate acute doses (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:

|                      |   |                                                             |
|----------------------|---|-------------------------------------------------------------|
| <i>ADR</i>           | = | Acute dose rate (mg/kg-day)                                 |
| <i>SWC</i>           | = | Surface water concentration (ppb or µg/L)                   |
| <i>K<sub>p</sub></i> | = | Permeability coefficient (cm/h)                             |
| <i>SA</i>            | = | Skin surface area exposed (cm <sup>2</sup> )                |
| <i>ET</i>            | = | Exposure time (h/day)                                       |
| <i>CF1</i>           | = | Conversion factor (1.0×10 <sup>-3</sup> mg/µg)              |
| <i>CF2</i>           | = | Conversion factor (1.0×10 <sup>-3</sup> L/cm <sup>3</sup> ) |
| <i>BW</i>            | = | Body weight (kg)                                            |

The 1,2-dichloroethane skin permeability coefficient used in the equations above was the predicted *K<sub>p</sub>* value presented in the EPA Risk Assessment Guidance for Superfund for organic contaminants in water (*K<sub>p</sub>* = 4.2×10<sup>-3</sup> 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<sub>p</sub>*) from an aqueous vehicle is more appropriate and is provided in the Superfund document 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 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 Waste handling, treatment, and disposal COU.

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

| Scenario/OES  | 1,2-Dichloroethane<br>Surface Water<br>Concentrations |                                  | Adult<br>(21+ years) | Youth<br>(11–15 years) | Child<br>(6–10 years) |
|---------------|-------------------------------------------------------|----------------------------------|----------------------|------------------------|-----------------------|
|               | 30Q5<br>Conc.<br>(µg/L)                               | Harmonic<br>Mean Conc.<br>(µg/L) | ADR<br>(mg/kg-day)   | ADR<br>(mg/kg-day)     | ADR<br>(mg/kg-day)    |
| Manufacturing | 1.9E03                                                | 1.11E03                          | 1.5E-03              | 1.2E-03                | 7.2E-04               |

| Scenario/OES                                                                                                                                                                                                                                                                                                                                      | 1,2-Dichloroethane<br>Surface Water<br>Concentrations |                                  | Adult<br>(21+ years) | Youth<br>(11–15 years) | Child<br>(6–10 years) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------|----------------------|------------------------|-----------------------|
|                                                                                                                                                                                                                                                                                                                                                   | 30Q5<br>Conc.<br>(µg/L)                               | Harmonic<br>Mean Conc.<br>(µg/L) | ADR<br>(mg/kg-day)   | ADR<br>(mg/kg-day)     | ADR<br>(mg/kg-day)    |
| Processing/Processing as a reactant                                                                                                                                                                                                                                                                                                               | 2.1E02                                                | 1.29E02                          | 1.7E-04              | 1.3E-04                | 8.0E-05               |
| Processing/Processing into a<br>formulation, mixture, or reaction<br>product                                                                                                                                                                                                                                                                      | 1.2E01                                                | 1.2E01                           | 9.7E-06              | 7.4E-06                | 4.5E-06               |
| Waste handling, treatment, and<br>disposal/POTW                                                                                                                                                                                                                                                                                                   | 1.4E03                                                | 5.27E02                          | 1.1E-03              | 8.5E-04                | 5.1E-04               |
| Waste handling, treatment, and<br>disposal/incinerator                                                                                                                                                                                                                                                                                            | 2.6E03                                                | 1.38E03                          | 2.1E-03              | 1.6E-03                | 9.7E-04               |
| 30Q5 = lowest 30-day average flow that occurs (on average) once every 5 years; ADD = average daily dose; ADR = acute dose rate; OES = occupational exposure scenario<br><sup>a</sup> For each OES, dermal estimates are presented for the exposures corresponding to the highest surface water concentrations and the corresponding dermal doses. |                                                       |                                  |                      |                        |                       |

## 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 3.2.3), release data used as model input data ([U.S. EPA, 2025f](#)), and agreement between modeled and monitored ambient air concentrations ([U.S. EPA, 2025e](#)). 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 HEM 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 3-9, 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 the DMRs, provide evidence for releases to receiving waterbodies. 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)

958 were obtained outside of the systematic review process used for obtaining other physical and chemical  
959 properties. Therefore, EPA has moderate confidence in the deposition fluxes estimated from TRI and  
960 NEI release data using AERMOD. Overall, EPA has slight confidence in the accuracy of its exposure  
961 estimates for incidental ingestion of soils from biosolids and air deposition due to assumptions made for  
962 the exposure scenarios (*e.g.*, ingestion rate) and uncertainties in the media concentrations; however, the  
963 Agency has robust confidence that exposure scenarios modeled represent high-end scenarios that are  
964 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 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 of 1,2-dichloroethane ([U.S. EPA, 2025e](#)). 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 Manufacturing and the Disposal COUs. 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. EPA has robust confidence that the modeled exposure scenarios via the land pathways are health protective and represent high-end scenarios.

## REFERENCES

- [SC&A](#). (2023). The HEM4 User's Guide: Instructions for using the Human Exposure Model for Single and Multiple Facility Exposure and Risk Modeling, Open-Source Version 4.2 with Demographic Assessment Module and 2020 Census. Research Triangle Park, NC: Air Toxics Assessment Group, U.S. Environmental Protection Agency.  
[https://www.epa.gov/system/files/documents/2023-03/HEM4\\_2\\_Users\\_Guide\\_1-2-23.pdf](https://www.epa.gov/system/files/documents/2023-03/HEM4_2_Users_Guide_1-2-23.pdf)
- [U.S. EPA](#). (2004). Risk assessment guidance for Superfund. Vol. I. Human health evaluation manual (Part E, supplemental guidance for dermal risk assessment). (EPA/540/R/99/005). Washington, DC: Office of Superfund Remediation and Technology Innovation. Available online at [http://www.epa.gov/oswer/riskassessment/rage/pdf/part\\_e\\_final\\_revision\\_10-03-07.pdf](http://www.epa.gov/oswer/riskassessment/rage/pdf/part_e_final_revision_10-03-07.pdf).
- [U.S. EPA](#). (2011). Exposure factors handbook: 2011 edition [EPA Report]. (EPA/600/R-090/052F). Washington, DC: U.S. Environmental Protection Agency, Office of Research and Development, National Center for Environmental Assessment.  
<https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockkey=P100F2OS.txt>
- [U.S. EPA](#). (2017). Update for Chapter 5 of the Exposure Factors Handbook: Soil and dust ingestion [EPA Report]. (EPA/600R-17/384F). Washington, DC: National Center for Environmental Assessment, Office of Research and Development.  
<https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockkey=P100TTX4.txt>
- [U.S. EPA](#). (2020b). The Technical Support Document for the Hazardous Waste Delisting Risk Assessment Software (DRAS). Washington, DC: U.S. Environmental Protection Agency, Office of Solid Waste. <https://www.epa.gov/hw/technical-support-document-hazardous-waste-delisting-risk-assessment-software-dras>
- [U.S. EPA](#). (2023b). Meeting minutes and final report for the Science Advisory Committee on Chemicals public virtual meeting "2023 Draft Supplement to the 1,4-Dioxane Risk Evaluation" held on September 12-14, 2023. Washington, DC.
- [U.S. EPA](#). (2025a). Draft Byproducts Assessment for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025b). Draft Chemistry and Fate and Transport Assessment for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025c). Draft Consumer Exposure Assessment for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025d). Draft Drinking Water Exposure Estimates for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025e). Draft Environmental Media Assessment for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025f). Draft Environmental Release Assessment for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025g). Draft Fish Ingestion Risk Calculator for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025h). Draft Occupational Exposure Assessment for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025i). Draft Risk Evaluation for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025j). Draft Supplemental Information on AERMOD Generic Releases Exposure and Risk Analysis for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.
- [U.S. EPA](#). (2025k). Draft Supplemental Information on AERMOD NEI Exposure and Risk Analysis for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of

Chemical Safety and Pollution Prevention.

U.S. EPA. (2025l). Draft Supplemental Information on AERMOD TRI Exposure and Risk Analysis for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.

U.S. EPA. (2025m). Risk Evaluation for 1,1-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention.

<https://www.regulations.gov/docket/EPA-HQ-OPPT-2024-0114>

U.S. EPA. (2025n). Summary of and Response to External Peer Review and Public Comments on the Risk Evaluation for 1,1-Dichloroethane and Human Health Hazard Technical Support Document for 1,2-Dichloroethane. Washington, DC: Office of Pollution Prevention and Toxics, Office of Chemical Safety and Pollution Prevention. <https://www.regulations.gov/docket/EPA-HQ-OPPT-2024-0114>