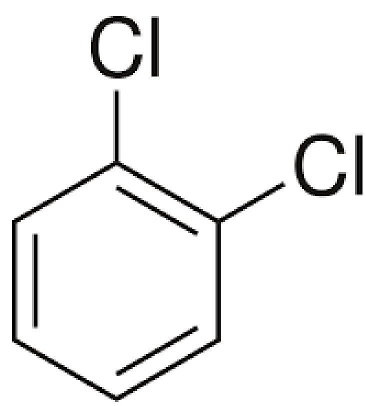
EPA Document# EPA-740-D-26-021
August 2026
Office of Chemical Safety and
Pollution Prevention

United States
Environmental Protection Agency

Draft Risk Evaluation for *o*-Dichlorobenzene

CASRN 95-50-1



August 2026

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX TABLES

ACKNOWLEDGEMENTS

The Assessment Team gratefully acknowledges the participation, input, and review comments 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 as well as the Office of General Council. The Agency is also grateful for assistance from EPA contractors: General Dynamics Information Technology, Inc. (Contract Nos. HHSN316201200013W and 68HERD24A000); ICF, Inc. (Contract No. 68HERC23D0007); SpecPro Professional Services, LLC (Contract No. 68HERC20D0021); SpecPro Sustainable and Environmental, LLC (Contract No. 68HERC25D0004); and SRC, Inc. (Contract No.68HERC25D0001).

Docket

Supporting information can be found in the public docket, Docket ID EPA-HQ-OPPT-2018-0444.

Disclaimer

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EXECUTIVE SUMMARY

EPA evaluated *o*-dichlorobenzene health and environmental risks across its conditions of use (COUs), under section 6 of the Toxic Substances Control Act (TSCA), ranging from manufacture to disposal. Of 24 COUs evaluated, the Agency has preliminarily determined that *o*-dichlorobenzene presents an unreasonable risk of injury to human health based on non-cancer risk driven by (1) inhalation and/or dermal exposure to workers from 14 COUs; (2) inhalation exposure to occupational non-users (ONUs[1]) from 6 COUs (a subset of the 14 COUs with risk to workers); and (3) inhalation exposure to consumers from 1 COU (Table ES-1). EPA has preliminarily determined that exposure to *o*-dichlorobenzene by the general population, including fenceline communities, under the COUs does not significantly contribute to unreasonable risk. EPA has also preliminarily determined that environmental exposures via soil, air, surface water, and sediment under the COUs do not significantly contribute to any unreasonable risk to the environment from *o*-dichlorobenzene.

EPA designated *o*-dichlorobenzene as a high priority substance for risk evaluation in December 2019 and followed with the release of the *Final Scope of the Risk Evaluation for o-Dichlorobenzene; CASRN 95-50-1* in August 2020 (U.S. EPA, 2020d). In alignment with the final scope's Analysis Plan, the Agency evaluated all reasonably available physical and chemical properties, environmental fate, and environmental release data and determined that air is the major exposure pathway for *o*-dichlorobenzene.

This draft risk evaluation assesses human health risk to workers, ONUs, consumers, and the general population, including potentially exposed or susceptible subpopulations (PESS), as well as environmental risks. *o*-Dichlorobenzene is released to the environment via land disposal, surface water discharge, and air emissions from industrial and commercial releasing facilities.

o-Dichlorobenzene is a liquid at ambient temperatures with low-to-moderate water solubility and sorption to soil, sediment, or organic matter. Releases are primarily to air, and *o*-dichlorobenzene will generally remain in air, with potential for long-range transport given its persistence in air and limited degradation. *o*-Dichlorobenzene is rarely detected in surface water, sediment, soil, or groundwater. It is not expected to be present or persist on land or in water given the negligible releases and its volatility, lack of sorption to soil or organic matter, and negligible air deposition. *o*-Dichlorobenzene is primarily imported into the United States rather than domestically manufactured; however, it is manufactured in the United States as a byproduct (*e.g.*, when manufacturing vinyl chloride monomer [VCM]). In this process, *o*-dichlorobenzene is separated from the intended product and managed as waste. Based on 2020 Chemical Data Reporting (CDR) data, *o*-dichlorobenzene is imported into the country for its intended uses, with a total production volume (domestic manufacturing volume + the imported volume) in the United States of less than 1,000,000 pounds (lb) per year during the years of 2016 through 2019 (U.S. EPA, 2020b). Preliminary review of 2024 CDR data indicates that *o*-dichlorobenzene has also been domestically manufactured as a primary product in recent years; EPA intends to incorporate 2024 CDR data and other reasonably available information regarding domestic manufacture of *o*-dichlorobenzene into the final risk evaluation.

Several industrial, commercial, and consumer uses of *o*-dichlorobenzene have been identified, ranging from industrial use in solvents (which become part of product formulation or mixtures) as well as commercial and consumer use in inks and toners, paints and coatings, lubricants and greases, fuel additives, air care products as continuous-action air fresheners, and cleaning and furnishing care

[1] ONUs do not directly handle *o*-dichlorobenzene but may be indirectly exposed to it in the workplace as part of their employment.

products. In addition to exposure to aquatic and terrestrial vertebrates, invertebrates, and plants, EPA anticipates that (1) workers and consumers may be exposed to *o*-dichlorobenzene from inhalation and dermal routes; and (2) the general population may be exposed through ambient air, indoor air, and ingestion of drinking water.

Determining Unreasonable Risk to Human Health

In TSCA existing chemical risk evaluations, EPA must determine whether a chemical substance, under the COUs, does or does not present unreasonable risk of injury to human health or the environment. The unreasonable risk must be consistent with the best available science and consider PESS. The Agency, in determining whether *o*-dichlorobenzene presents unreasonable risk to human health and the environment, considered risk-related factors as described in its risk evaluation framework rule and as required under TSCA (U.S. EPA, 2024b). Risk-related factors beyond the levels of *o*-dichlorobenzene that can impact the unreasonable risk determination include but are not limited to the type of health effect under consideration; the reversibility of the health effect being evaluated; exposure-related considerations (*e.g.,* duration, magnitude, frequency of exposure); population exposed (including PESS); as well as EPA's confidence in the information used to inform the hazard and exposure values. These considerations are included as part of the evaluation of hazard and exposure to *o*-dichlorobenzene. If an estimate of risk for a specific scenario exceeds the standard risk benchmarks, then the determination of whether those risks significantly contribute to the unreasonable risk of *o*-dichlorobenzene under TSCA is both case-by-case and context-driven. EPA considers all of the aforementioned risk-related factors when determining whether a COU under TSCA significantly contributes to unreasonable risk.

EPA also evaluated PESS, described in Section 4.3.5 and summarized in Table 4-19. The Agency was able to incorporate considerations for multiple PESS factors into risk estimates, through the use of exposure factors, uncertainty factors (UFs), and evaluation of PESS group-specific data. For this draft *o*-dichlorobenzene risk evaluation, EPA accounted for the following PESS groups: workers (including those with high-end exposures); consumers (including those with high-intensity use), older adults with reduced lung function; age groups who have higher intake per body weight (*e.g*., infants, subpopulations that use untreated surface water or groundwater as a primary source of drinking water); and ("fenceline") communities who live near facilities that emit *o*-dichlorobenzene. Additional information on other factors that could possibly impact greater biological susceptibility or exposure potential following exposure to *o*-dichlorobenzene—such as more comprehensive information on pre-existing diseases in humans, nutritional status, or other chemical co-exposures and non-chemical stressors—was not reasonably available.

The Agency assessed risks to people exposed to *o*-dichlorobenzene at work, indoors, and outdoors using a combination of screening-level and more refined approaches. EPA evaluated reasonably available information for human health hazards from *o*-dichlorobenzene, including the following:

- non-cancer respiratory toxicity in workers and ONUs from acute inhalation exposures; and,
- non-cancer liver toxicity in workers from acute dermal exposures.

Workers with the greatest potential for exposure are those who work directly with the chemical in environments where *o*-dichlorobenzene is processed.

EPA considered the weight of scientific evidence to determine confidence levels in underlying datasets and risk estimates of *o*-dichlorobenzene for human health (Section 4.3.7). For the general population, the Agency has robust confidence in the overall characterization of inhalation exposure to ambient air and indoor air as well as ingestion of drinking water.

For workers and ONUs, EPA has confidence ratings between slight-to-moderate and robust for the risk estimates calculated for inhalation exposure scenarios, and moderate confidence in the risk estimates for non-cancer dermal exposure scenarios—depending on the source of data for each COU. For consumers, EPA has robust confidence in the risk estimates calculated for inhalation and dermal exposure scenarios and robust confidence that the consumer exposure scenarios represent a conservative upper bound on exposure.

Based on the consumer risk estimates and related risk factors, EPA preliminarily identified unreasonable risk of injury to human health for consumers from 1 COU. For each of the consumer COUs, EPA evaluated the exposure to consumers using the Consumer Exposure Model (CEM) Version 3.2 (U.S. EPA, 2023a) or the Indoor Environmental Concentrations in Buildings with Conditioned and Unconditioned Zones (IECCU) Version 1.1 (U.S. EPA, 2019b) to calculate the 24-hour time-weighted average (TWA) and 1-year chronic average daily concentrations for inhalation and dermal exposures to *o*-dichlorobenzene during relevant product use. For all scenarios except the septic tank cleaner scenario, EPA used inputs representative of high-end values for several parameters, including the highest weight fractions across all products for all exposure durations, in addition to high-end values for product use frequency and duration for scenarios relevant to acute and intermediate exposure durations.

For chronic exposures, EPA used values for product use frequency and duration more representative of central tendency, as consumers are not anticipated to use products at their maximum frequency and for long-term durations. For the septic tank cleaner scenario, the Agency refined the analysis by using product-specific weight fraction from safety data sheets (SDSs) and mass used from product directions. Even considering these conservative estimates, risk estimates for acute inhalation exposure were above the benchmark for all but one consumer COU. Similarly for dermal exposure, both adult and youth acute margin of exposures (MOEs) were above the benchmark for all scenarios. However, for the consumer use associated with *o*-dichlorobenzene-containing septic tank cleaners, EPA's inhalation exposure assessment resulted in an acute (*i.e.*, single-day) MOE well below the benchmark MOE of 30; therefore, the Agency has preliminarily determined it significantly contributes to the unreasonable risk of *o*-dichlorobenzene. While EPA has robust confidence in the exposure and risk estimates, there is uncertainty in whether *o*-dichlorobenzene is currently being used or is reasonably foreseen to be used in septic tank cleaner products, given the most recent SDS identified was from 2014 (Utility Wonder Products, 2014). Therefore, the Agency intends to investigate these uses further and incorporate findings between this draft and the release of the final risk evaluation for *o*-dichlorobenzene.

For the general population, EPA used the Integrated Indoor-Outdoor Air Calculator (IIOAC) (U.S. EPA, 2024a) to model ambient and indoor air concentrations based on facility-reported releases to the Toxics Release Inventory (TRI) database from 2019 to 2023. To assess risk from exposure to *o*-dichlorobenzene via drinking water, EPA conducted a screening-level assessment using the highest concentration reported in surface water and groundwater in conjunction with conservative exposure parameters for drinking water intake rate and body weight to calculate dose. General population exposure pathways through soil, swimming, and fish ingestion are not expected based on volatility from soil and water as well as low potential of *o*-dichlorobenzene to bioaccumulate in fish. All non-cancer screening-level risk estimates were above the benchmark; therefore, EPA preliminarily did not identify unreasonable risk of injury to the general population.

Determining Unreasonable Risk to the Environment

Based on this draft risk evaluation for *o*-dichlorobenzene—including the physical and chemical properties of *o*-dichlorobenzene, the environmental exposures and effects, the resulting risk estimates, and consideration of strengths, limitations, and uncertainties—EPA preliminarily did not identify unreasonable risk of injury to the environment from exposure to *o*-dichlorobenzene via any COU.

The Agency assessed environmental concentrations of *o*-dichlorobenzene in air, water, and land (soil, biosolids, and groundwater) for use in the environmental exposure assessment. For each of these media, EPA compared high-end exposure estimates from modeling and monitoring data to the most sensitive hazard values for each of the relevant taxa exposed to those media in a screening-level assessment. The Agency is confident that this screening-level assessment for risk based on concentrations in the environment from releases applies across all COUs. EPA assessed releases using data reported to the TRI and Discharge Monitoring Report (DMR) from 2019 to 2023 for Manufacturing, Processing as a reactant, Industrial use of solvents, and Disposal, and determined that environmental releases for all other COUs are expected to be lower than releases associated with the preceding COUs. Therefore, the Agency is confident that when no risk is indicated with the screening-level approaches based on concentrations resulting from the maximum releases, no risk will occur from any COU for *o*-dichlorobenzene.

The resulting receiving water concentrations do not exceed acute aquatic hazard concentrations of concerns even under low flow conditions. Furthermore, available monitoring data indicate that *o*-dichlorobenzene is rarely detected in surface water and the maximum concentration of *o*-dichlorobenzene detected in surface water is over an order of magnitude lower than acute aquatic hazard thresholds identified for vertebrates and invertebrates, the chronic hazard threshold for aquatic vertebrates, and the hazard threshold for aquatic plants and algae. Although this maximum concentration exceeds the chronic hazard value for aquatic invertebrates, due to volatility, *o*-dichlorobenzene is not expected to remain in surface water for a long enough to result in chronic hazard to aquatic invertebrates.

Similarly, for terrestrial species, modeled and measured *o*-dichlorobenzene concentrations in ambient air are an order of magnitude lower than the most sensitive toxicity endpoint available for vertebrates. Therefore, based on this screening assessment, EPA concludes that exposure via the air pathway is not expected to exceed the hazard threshold and additional refinement of conservative assumptions was not needed.

Summary and Conclusions

EPA has preliminarily determined that *o*-dichlorobenzene presents unreasonable risk of injury to human health, driven by significant contributions to unreasonable risk from non-cancer effects to workers, ONUs, and consumers. Of the 24 assessed COUs for *o*-dichlorobenzene detailed in Section 1.2, with subsequent exposures and risk characterizations for human health and environmental species in Sections 4 and 5, EPA has preliminarily determined that a total of 15 COUs significantly contribute to unreasonable risk of injury to human health (Table ES-1).

Table ES-1. Conditions of Use of *o*-Dichlorobenzene That Significantly Contribute to Preliminary Determination of Unreasonable Risk to Human Health by Non-Cancer Effects[a]

COU[b]	Worker		ONUs	Consumers
	Dermal	Inhalation	Inhalation	Inhalation
Manufacturing – Import	×	×		
Processing – As a Reactant	×	×		

COU[b]	Worker		ONUs	Consumers
	Dermal	Inhalation	Inhalation	Inhalation
Processing – Incorporation into formulation, mixture, or reaction product – Intermediates in all other basic organic chemical manufacturing	×	×		
Processing – Incorporation into formulation, mixture, or reaction product – Solvents (which become part of product formulation or mixture)	×	×	×	
Processing – Incorporation into formulation, mixture, or reaction product – Soap, cleaning compound, and toilet preparation manufacturing	×	×	×	
Processing – Repackaging	×	×		
Processing – Recycling	×	×	×	
Industrial Use – Solvents (which become part of product formulation or mixture) – Printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing	×	×	×	
Industrial Use – Functional fluids (closed system) – All other basic chemical manufacturing	×	×		
Industrial Use – Non-incorporative activities – Processing aids, not otherwise listed	×	×	×	
Commercial Use – Ink, toner and colorant products – Ink and toners		×		
Commercial Use – Paints and coatings – Coatings and paints, thinners, paint removers		×	× [d]	
Commercial Use – Lubricants and greases		×		
Commercial Use – Other Use – Laboratory chemicals; Cleaning and furnishing care products [c]	×	×		
Consumer Use – Other use – Other use including ceramics glaze, and cleaning and furnishing care products				×

COU = condition of use; ONU = occupational non-user
[a] EPA did not identify a human relevant cancer hazard for *o*-dichlorobenzene.
[b] No unreasonable risk to the general population or the environment was identified for these COUs.
[c] Contribution to unreasonable risk for this COU is from dermal and inhalation exposure for the Cleaning and Furnishing Care Products occupational exposure scenario (OES) and from dermal exposure only for the Laboratory Chemicals OES.
[d] For the Commercial use – Paints and coatings COU, dermal risk to ONUs was evaluated in addition to inhalation; however, EPA has preliminarily determined that dermal risk to ONUs did not significantly contribute to unreasonable risk for this COU.
Shaded cells with × are COUs that significantly contribute to a preliminary determination of unreasonable risk of injury from *o*-dichlorobenzene for workers and/or ONUs.

EPA preliminarily did *not* identify significant contributions to unreasonable risk to human health (*i.e.,* workers, ONUs, consumers, and general population in proximity to *o*-dichlorobenzene-releasing facilities) from the following nine (9) COUs:

- Manufacture – Domestic manufacture;
- Distribution in commerce;
- Disposal;
- Commercial use – Fuels and related products – Fuel additive;
- Commercial use – Air care products – Continuous action air fresheners;
- Consumer use – Paints and coatings – Thinners, sheep branding fluid;
- Consumer use – Lubricants and greases;
- Consumer use – Fuels and related products – Fuel additive; and
- Consumer use – Air care products – Continuous action air fresheners.

Next Steps and Public Comment

This draft risk evaluation and the accompanying technical support documents (TSD) and supplemental files (see Appendix C) have been released for public comment. The *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w) and *Draft Transcriptomic Assessment for o-Dichlorobenzene and p-Dichlorobenzene* (U.S. EPA, 2026aj) were peer reviewed by the Science Advisory Committee on Chemicals (SACC) in June 2026 with the SACC report pending.

EPA will issue a final *o*-dichlorobenzene risk evaluation after considering input from the public and recommendations received from the SACC. Although EPA seeks public comment on all aspects of this draft risk evaluation package, the Agency particularly seeks comments on the following:

1. Process descriptions, worker activities, concentrations (in air, product, or process) and current prevalence of the following *o*-dichlorobenzene activities:
    a. Domestic manufacture
    b. Processing as a reactant
    c. Use in ink, toner, and colorant products
    d. Use as a cleaning product in the dry cleaning or furnishing care industry including evidence of use in the United States as a spot cleaner or alternative applications
    e. Consumer and commercial/occupational use as a cleaner for septic and cesspool tanks.
2. Consumer use septic tank cleaner products containing *o*-dichlorobenzene, including product availability, ingredients and composition, and use instructions.
3. Whether and how exposure controls and personal protective equipment (PPE) are used during the manufacture, processing, and use of *o*-dichlorobenzene for each of the COUs depicted in Table ES-1. Although EPA has test order data, additional information on when and where exposure controls and PPE are used (including for protection against inhalation and dermal exposures) would be informative.
4. The application (*i.e.,* mapping) of the Industrial Use of Solvents OES to the three COUs: (1) Processing – Recycling; (2) Industrial use – Solvents (which become part of product formulation or mixture) – Printing ink manufacturing; paint and coating manufacturing; synthetic dye and pigment manufacturing; and (3) Industrial use – Non-incorporative activities – Processing aids, not otherwise listed.
5. The approach for derivation and utility of 15-minute exposure values, including extrapolation of the hour occupational exposure value (OEV) to a 15-minute time-weighted average and extrapolation of the original animal data down to a 30-minute duration to calculate a short-term exposure value (STEV) based on principles of ten Berge et al., (1986).
6. The modeling approach used to determine inhalation exposure to *o*-dichlorobenzene from the

Use of Paints and Coatings OES, based on the Automotive Refinishing Spray Coating Mist Inhalation Model, which estimates worker inhalation exposure based on the concentration of the chemical of interest in the nonvolatile portion of the sprayed product and the concentration of over sprayed mist/particles (OECD, 2011a).

7. The confidence ratings applied to hazard and exposure values in this draft risk evaluation. For example, EPA applied a robust confidence rating for both hazard values, including for the liver POD (point of departure) when extrapolated to dermal exposure based on oral and inhalation data.

Following public comment on the full risk evaluation package and independent peer review of the previously released draft human health and environmental hazard assessment, EPA will issue a final risk evaluation that includes its determination as to whether *o*-dichlorobenzene presents unreasonable risk of injury to health or the environment under its COUs. If, in the final risk evaluation, the Agency determines that *o*-dichlorobenzene presents unreasonable risk of injury to human health or the environment, EPA will initiate regulatory action under TSCA section 6(a) to the extent necessary so that *o*-dichlorobenzene no longer presents such risk.

1 INTRODUCTION

EPA has evaluated *o*-dichlorobenzene under the Toxic Substances Control Act (TSCA) section 6(b). *o*-Dichlorobenzene is a clear-to-pale, yellow liquid with a pleasant, aromatic odor; it exists in a liquid phase at ambient temperatures. *o*-Dichlorobenzene has several TSCA conditions of use (COUs), including Domestic manufacture and import; Processing; Distribution in commerce; and Industrial, Commercial, and Consumer uses.

Figure 1-1 describes the major inputs, phases, and outputs/components of the TSCA risk evaluation process (U.S. EPA, 2024b)—from chemical prioritization to scoping to releasing the final risk evaluation.

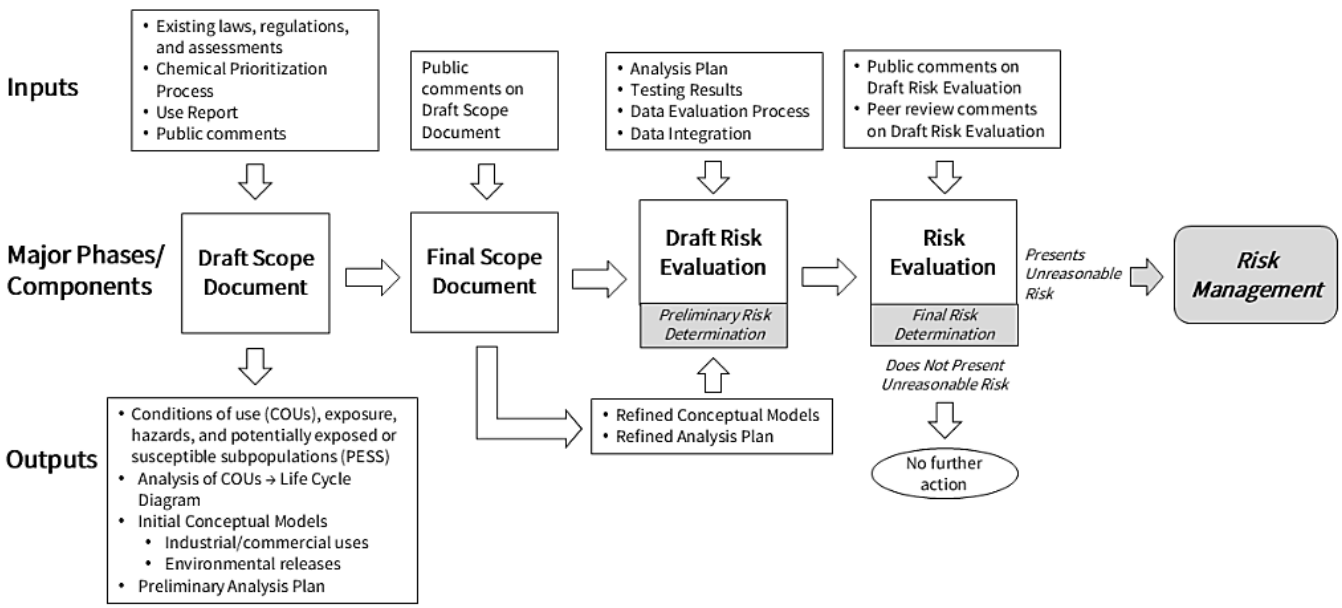

Figure 1-1. Overview of TSCA Existing Chemical Risk Evaluation Process

1.1 Scope of the Risk Evaluation

EPA designated *o*-dichlorobenzene as a high priority substance for risk evaluation in December 2019 and followed with the *Final Scope of the Risk Evaluation for o-Dichlorobenzene; CASRN 95-50-1* in August 2020 (also called the "final scope document" or "final scope") (U.S. EPA, 2020d). In alignment with the final scope's Analysis Plan, the Agency evaluated all reasonably available physical and chemical properties, environmental fate, and environmental release data and determined that air is the major exposure pathway. The Agency evaluated risk to human and environmental populations for *o*-dichlorobenzene. Specifically for human populations, EPA quantitatively evaluated risk to (1) workers and occupational non-users (ONUs) via the inhalation and dermal routes of exposure as described in Section 4.3.2, (2) consumers via inhalation and dermal exposure as described in Section 4.3.3, and, (3) the general population via inhalation route and oral ingestion (*i.e.*, drinking water) in Section 4.3.4. For environmental populations, the Agency assessed risk via water, sediment, and air to aquatic and terrestrial species in Section 5.

EPA used reasonably available information, defined in 40 CFR 702.33, in a fit-for-purpose approach to develop a risk evaluation that relies on the best available science and is based on the weight of scientific evidence. The Agency evaluated the quality of methods and reporting or results of the individual studies using the evaluations strategies described in the *Draft Systematic Review Protocol for o-*

Dichlorobenzene (U.S. EPA, 2026ae), or as otherwise noted in the relevant technical support documents (TSDs) and supplemental files.

This draft *o*-dichlorobenzene risk evaluation comprises multiple assessments/TSDs—each of which contains subassessments that inform the draft risk evaluation. A basic diagram showing the layout and relationship of these TSDsassessments is provided below in Figure 1-2. High-level summaries of each relevant TSD are presented in this draft risk evaluation. Detailed information for each technical support document can be found in the corresponding documents. Appendix C includes a list and citations for all technical support documents and supplemental files included in this draft risk evaluation for *o*-dichlorobenzene.

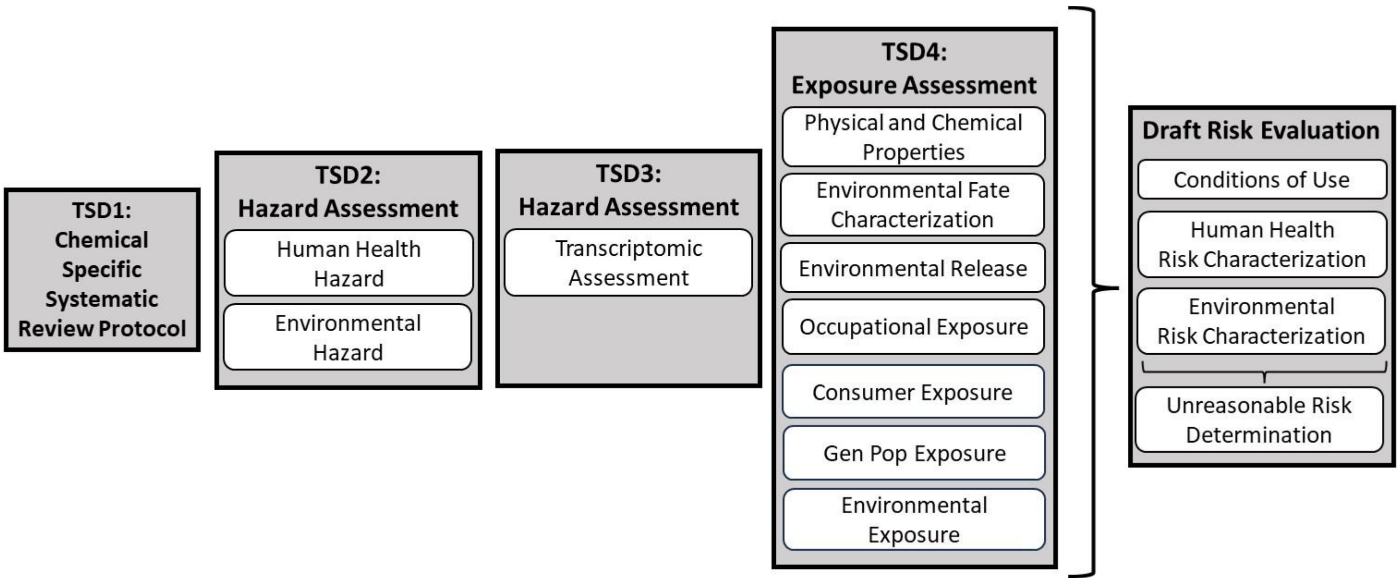

Figure 1-2. Draft Risk Evaluation Document Summary Map for *o*-Dichlorobenzene

TSD = Technical Support Document Hazard Assessments (TSD2 and TSD3) peer reviewed by the Science Advisory Committee on Chemicals (SACC); see also Appendix C.

1.1.1 Life Cycle and Production Volume

The life cycle diagram (LCD) in Figure 1-3 below depicts the COUs that are within the scope of this draft risk evaluation during various life cycle stages—including manufacture, processing, distribution, use (industrial, commercial, consumer), and disposal. The LCD has been updated since its original inclusion in the final scope document (U.S. EPA, 2020d). A complete list of updates and explanations of the updates made to COUs for *o*-dichlorobenzene from the final scope document to this draft risk evaluation is provided in Appendix D.

The LCD is a graphical representation of the various life stages of the industrial, commercial, and consumer use categories included within the scope of this draft risk evaluation. The information in the life cycle diagram is grouped according to the Chemical Data Reporting (CDR) processing codes and use categories (including functional use codes for industrial uses and product categories for industrial, commercial, and consumer uses). The CDR Rule under TSCA section 8(a) (see 40 CFR part 711) requires U.S. manufacturers (including importers) who manufactured/imported 25,000 pounds (lb) or more of a relevant chemical for commercial purposes during any calendar year, to provide EPA with information on the chemicals they manufacture or import into the United States. The Agency collects CDR data approximately every 4 years with the latest collections occurring in 2020 and 2024. Based on the 2020 CDR reporting, *o*-dichlorobenzene had a total production volume (domestic manufacture plus import) in the United States of less than 1,000,000 lb per year during the years of 2016 through 2019

(U.S. EPA, 2020b). Data from the 2024 CDR reporting will be incorporated into the final risk evaluation. The *Draft Air Release Summary and Statistics for TRI o-Dichlorobenzene* (U.S. EPA, 2026c), *Draft Water Release Summary for DMR and TRI o-Dichlorobenzene* (U.S. EPA, 2026ag), and the *Draft Land Release Summary for TRI o-Dichlorobenzene* (U.S. EPA, 2026y) contain details for each manufacturing, processing, use, and disposal category. The *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) contains additional descriptions (*e.g.,* process descriptions, worker activities, process flow diagrams) for each manufacturing, processing, use, and disposal category.

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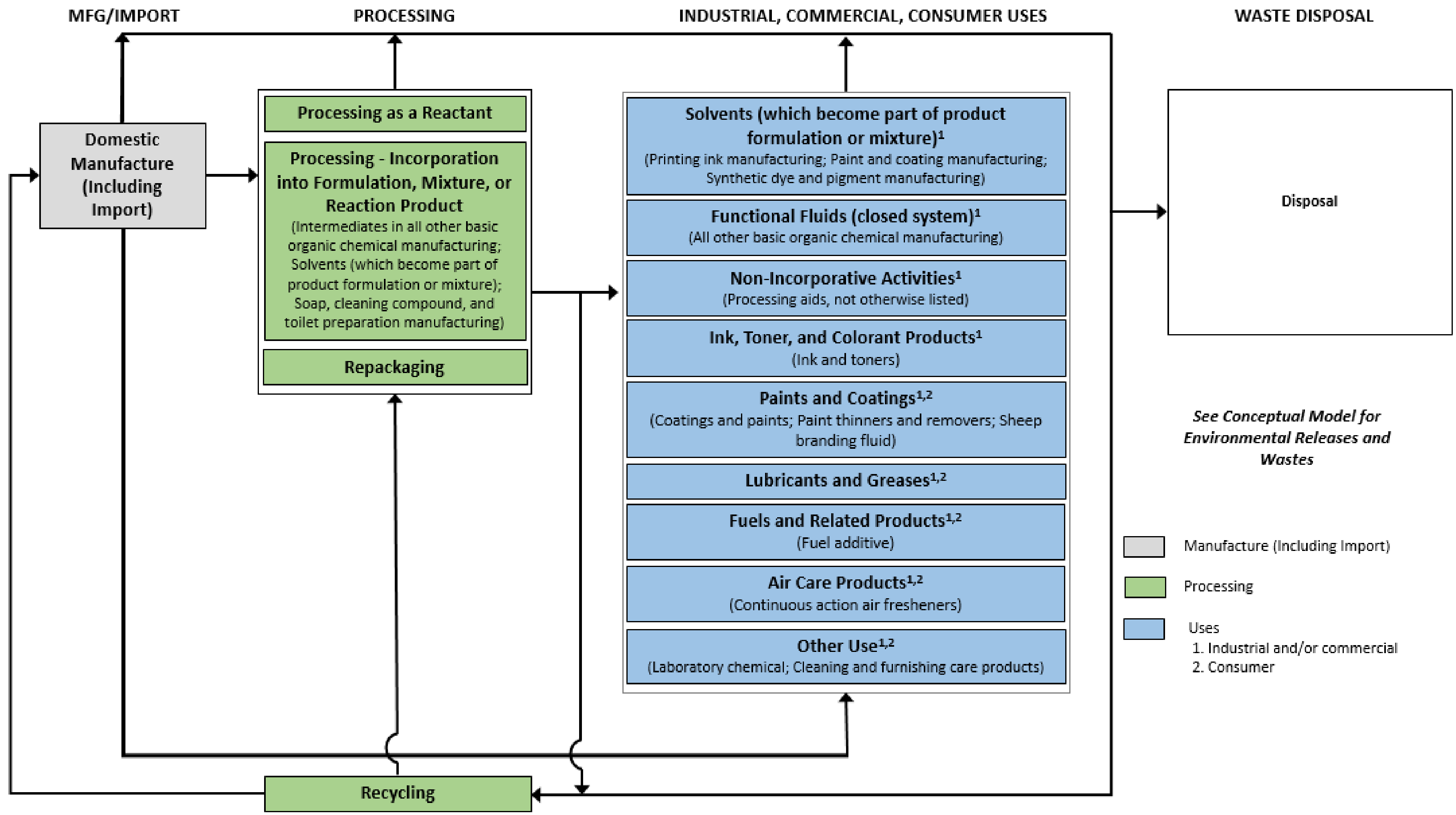

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605 **Figure 1-3. *o*-Dichlorobenzene Life Cycle Diagram**
606 [a] See Table 1-1 for categories and subcategories of conditions of use.

1.2 Conditions of Use Included in the Risk Evaluation

The final scope (U.S. EPA, 2020d) identified and described the life cycle stages, categories, and subcategories that comprise COUs that EPA planned to consider in the draft risk evaluation. TSCA section 3(4) defines COUs as "the circumstances, as determined by the Administrator, under which a chemical substance is intended, known, or reasonably foreseen to be manufactured, processed, distributed in commerce, used, or disposed of." EPA identifies COUs for chemicals during the scoping phase and presents them in the scoping document, though the COUs presented may change between the scope document and the risk evaluation itself as the assessment is conducted and more information about the chemical is gathered.

EPA only evaluated risks resulting from exposure to *o*-dichlorobenzene from facilities that use, manufacture (including as a byproduct), or process *o*-dichlorobenzene under industrial and/or commercial COUs subject to TSCA and the products resulting from such manufacture and processing. Each COU has a unique combination of lifestyle stage, category, and subcategory that describes the chemical's use. EPA has identified a total of 24 COUs for *o*-dichlorobenzene. All COUs for *o*-dichlorobenzene included in this draft risk evaluation are presented in Table 1-1 below.

623 **Table 1-1. Categories and Subcategories of Condition of Use in the Risk Evaluation for *o*-Dichlorobenzene**

Condition of Use[d]			Source(s)
Life Cycle Stage[a]	**Category[b]**	**Subcategory[c]**	
Manufacture	Domestic manufacture	N/A	(Exponent Inc., 2024)
	Import	N/A	(U.S. EPA, 2020a)
Processing	Processing as a reactant	N/A	(U.S. EPA, 2020a)
	Processing –Incorporation into a formulation, mixture, or reaction product	Intermediates in all other basic organic chemical manufacturing	(U.S. EPA, 2020a)
		Solvents (which become part of product formulation or mixture)	(U.S. EPA, 2020a); EPA-HQ-OPPT-2018-0444-0013; EPA-HQ-OPPT-2018-0444-0026
		Soap, cleaning compound, and toilet preparation manufacturing	EPA-HQ-OPPT-2018-0444-0017
	Repackaging	N/A	
	Recycling	N/A	(U.S. EPA, 2020a)
Distribution in commerce	N/A	N/A	
Industrial use	Solvents (which become part of product formulation or mixture)	Printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing	(U.S. EPA, 2020a); EPA-HQ-OPPT-2018-0444-0035
	Functional fluids (closed system)	All other basic organic chemical manufacturing	EPA-HQ-OPPT-2018-0444-0035
	Non-incorporative activities	Processing aids, not otherwise listed	CBI comment; EPA-HQ-OPPT-2018-0444-0037; EPA-HQ-OPPT-2018-0444-0035
Commercial use	Ink, toner, and colorant products	Ink and toners	(U.S. EPA, 2020a); EPA-HQ-OPPT-2018-0444-0004
	Paints and coatings	Coatings and paints, thinners, paint removers	(U.S. EPA, 2020a; Heiniger Australia Pty Ltd, 2016); EPA-HQ-OPPT-2018-0444-0004;
	Lubricants and greases	N/A	EPA-HQ-OPPT-2018-0444-0004; EPA-HQ-OPPT-2018-0444-0013; EPA-HQ-OPPT-2019-0131-0022; EPA-HQ-OPPT-2018-0444-0026; (Marvel Oil Company, 2024)
	Fuels and related products	Fuel additive	EPA-HQ-OPPT-2018-0444-0026; (Marvel Oil Company, 2024)

Condition of Use[d]			Source(s)
Life Cycle Stage[a]	**Category[b]**	**Subcategory[c]**	
	Air care products	Continuous action air fresheners	(Willert Home Products, 2019)
	Other use	Laboratory chemicals; Cleaning and furnishing care products	EPA-HQ-OPPT-2018-0444-0013; (Utility Wonder Products, 2014)
Consumer use	Paints and coatings	Thinners, sheep-branding fluid	(Mayco, 2022); (Heiniger Australia Pty Ltd, 2016)
	Lubricants and greases	N/A	EPA-HQ-OPPT-2018-0444-0013; EPA-HQ-OPPT-2019-0131-0022; EPA-HQ-OPPT-2018-0444-0026; (Marvel Oil Company, 2024)
	Fuels and related products	Fuel additive	EPA-HQ-OPPT-2018-0444-0026; (Marvel Oil Company, 2024)
	Air care products	Continuous action air fresheners	(Willert Home Products, 2019)
	Other use	Other use including ceramics glaze, and cleaning and furnishing care products	EPA-HQ-OPPT-2018-0444-0013; (Duncan Enterprises, 2013; Mayco, 2023a, b, c, d; Utility Wonder Products, 2014)
Disposal	N/A	N/A	(U.S. EPA, 2026c, y, 2026ag)

[a] Life Cycle Stage Use Definitions (40 CFR 711.3)
- "Industrial use" means use at a site at which 1 or more chemicals or mixtures are manufactured (including imported) or processed.
- "Commercial use" means the use of a chemical or a mixture containing a chemical (including as part of an article) in a commercial enterprise providing saleable goods or services.
- "Consumer use" means the use of a chemical or a mixture containing a chemical (including as part of an article, such as furniture or clothing) when sold to or made available to consumers for their use.
- Although EPA has identified both industrial and commercial uses here for purposes of distinguishing scenarios in this document, the Agency interprets the authority over "any manner or method of commercial use" under TSCA section 6(a)(5) to reach both.

[b] These categories of conditions of use (COUs) appear in the life cycle diagram, reflect Chemical Data Reporting (CDR) codes, and broadly represent conditions of use of *o*-dichlorobenzene in industrial and/or commercial settings and for consumer uses.

[c] These subcategories reflect more specific COUs of *o*-dichlorobenzene.
- In this draft risk evaluation, EPA added the COU Processing – Repackaging to account for the repackaging for distribution of *o*-dichlorobenzene.
- In this draft risk evaluation, EPA added the COU Manufacture – Domestic manufacture to account for when *o*-dichlorobenzene is manufactured domestically as a byproduct in the context of domestic vinyl chloride monomer (VCM) production. In the final risk evaluation, EPA intends to consider and incorporate 2024 CDR data and other reasonably available information regarding domestic manufacture of *o*-dichlorobenzene as a primary product.

[d] The total number of COUs (24) are determined by the categories/subcategories.

A complete list of updates and explanations of the updates made to COUs for *o*-dichlorobenzene from the final scope document to this draft risk evaluation is provided in Appendix D.

1.2.1 Conceptual Models

1.2.1.1 Exposure Pathways, Exposure Routes and Hazard to Human Population from Industrial and Commercial Activities and Uses of *o*-Dichlorobenzene

Figure 1-4 presents the conceptual model for exposure pathways, exposure routes, and hazards to human populations from industrial and commercial activities and uses of *o*-dichlorobenzene. There is potential for exposure to workers and/or ONUs via inhalation of vapor due to the activities and uses of *o*-dichlorobenzene. Exposure may occur due to fugitive emissions present during activities such as the manufacture and processing of *o*-dichlorobenzene. Fugitive air emissions are non-stack releases such as equipment leaks, evaporative losses, and building-ventilation releases. Exposure may also occur due to uses of *o*-dichlorobenzene such as use as laboratory chemicals or the application of paint or lubricant containing *o*-dichlorobenzene. Exposure may also occur through the dermal route for workers who handle *o*-dichlorobenzene. ONU dermal exposure to liquids may also occur with exposure to mist that collects on surfaces after spray application, which was assessed for the Use of Paints and Coatings OES. Dermal exposure to non-sprayed liquids is not expected for ONUs as they are not expected to directly handle *o*-dichlorobenzene.

1.2.1.2 Exposure Pathways, Exposure Routes, and Hazard to Human Populations from Consumer Activities and Uses of *o*-Dichlorobenzene

Figure 1-5 presents the exposure pathways, exposure routes and hazards to human receptors from consumer activities and uses of *o*-dichlorobenzene.

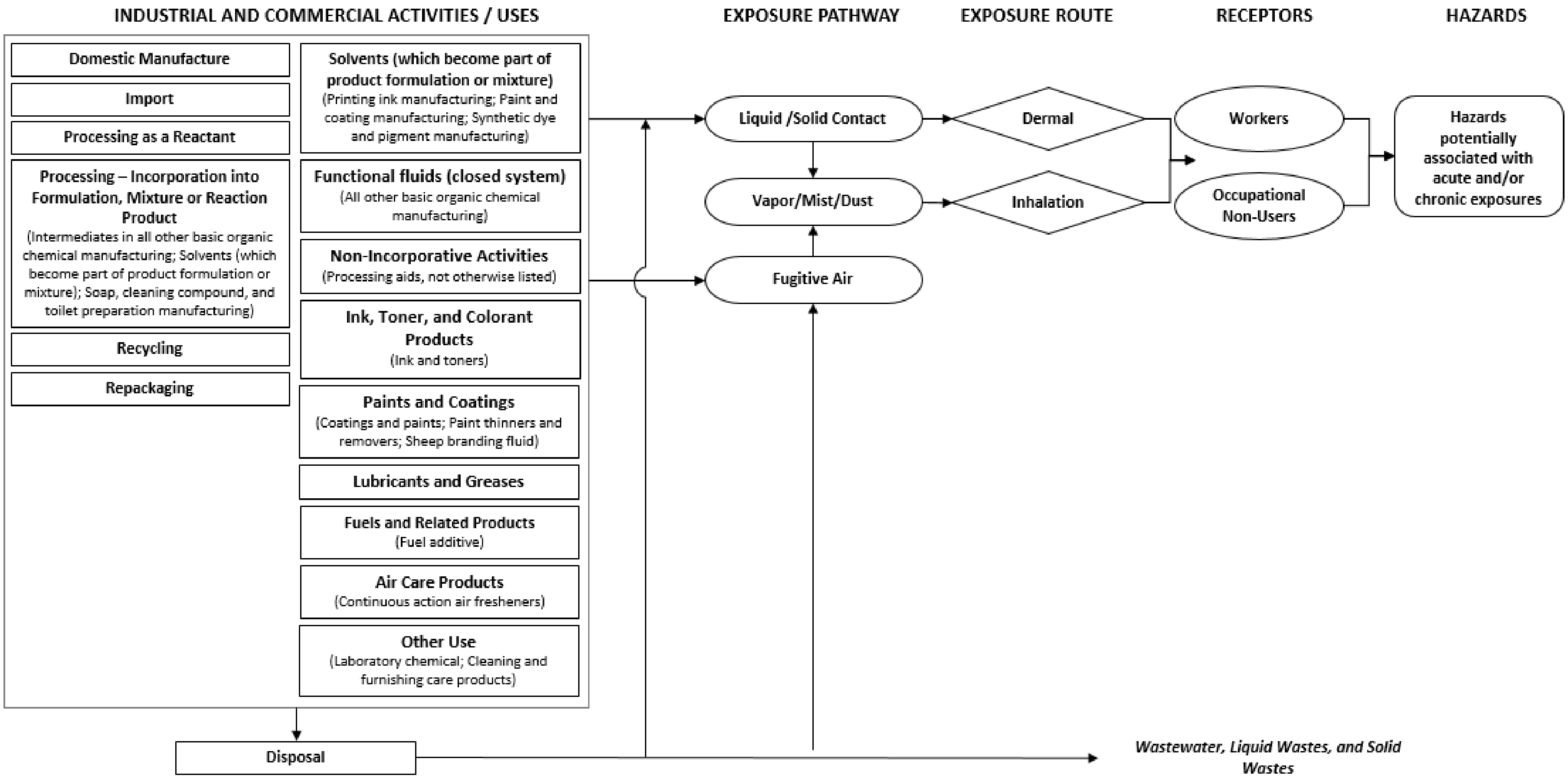

Figure 1-4. *o*-Dichlorobenzene Conceptual Model for Industrial and Commercial Activities and Uses: Worker Exposures and Hazards

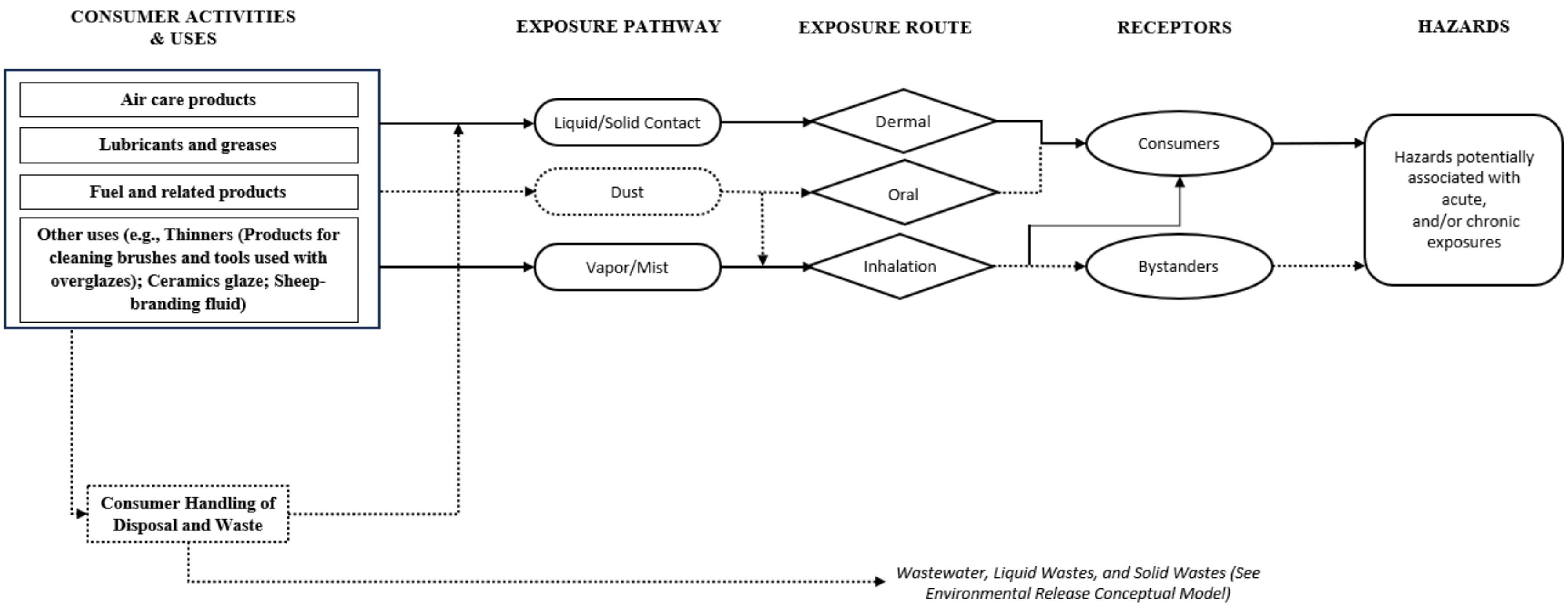

Figure 1-5. *o*-Dichlorobenzene Conceptual Model for Consumer Activities and Uses: Consumer Exposures and Hazards
Solid lines represent a quantitative assessment while broken lines represent a qualitative assessment.

1.2.1.3 Environmental Release and Waste: Environmental and General Population Exposures and Hazards

Figure 1-6 presents the conceptual model for environmental release and wastes. For *o*-dichlorobenzene, general population exposures were assessed from two pathways of exposure: air and water. Facility emissions of *o*-dichlorobenzene were used to model potential ambient air exposure via inhalation. Direct releases to water and monitoring concentrations of *o*-dichlorobenzene in surface water and groundwater were used to evaluate potential exposure via oral ingestion. Environmental exposures were also assessed from ambient air and surface water pathways to terrestrial organisms and aquatic organisms, respectively.

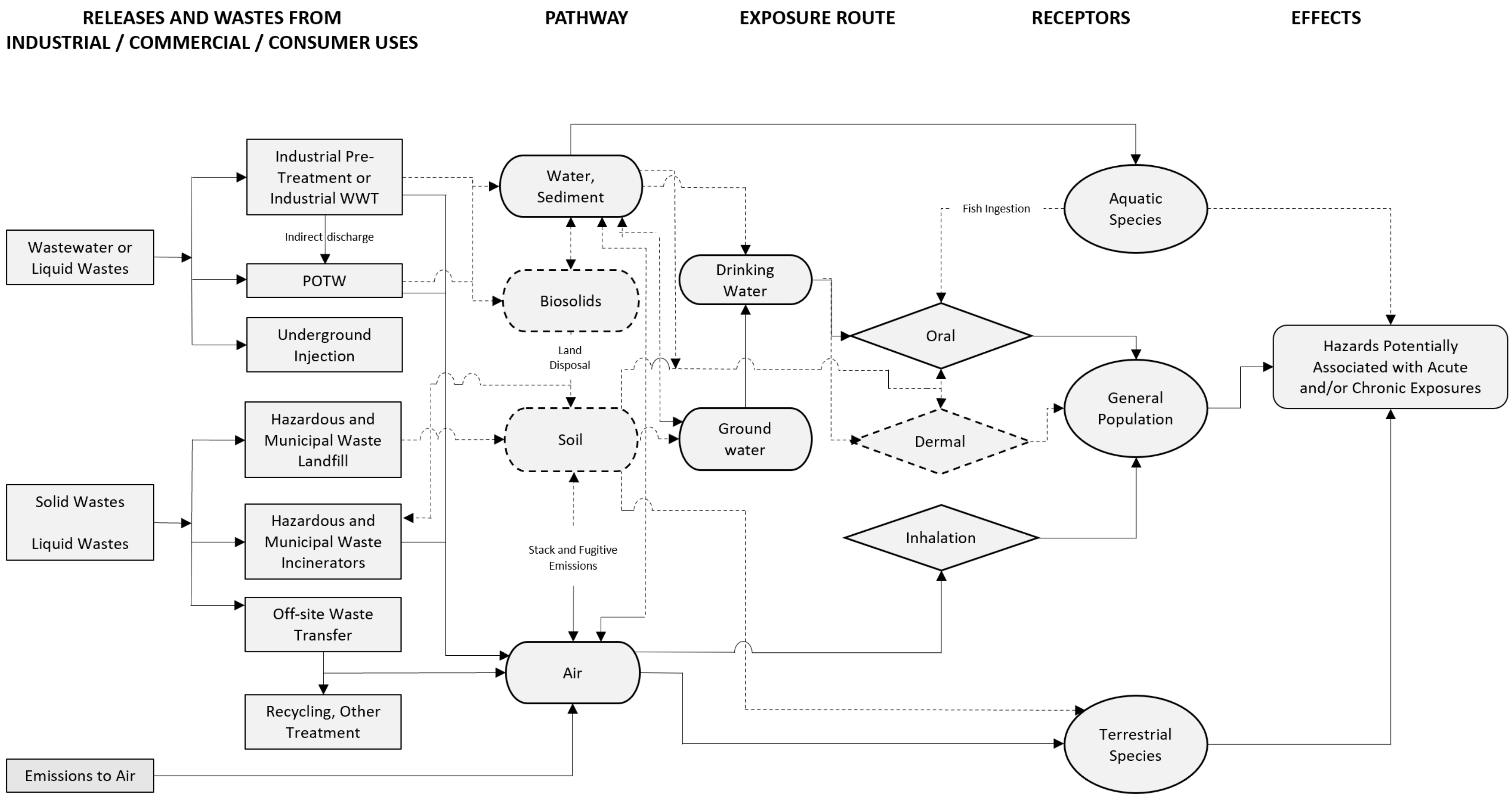

Figure 1-6. *o*-Dichlorobenzene Conceptual Model for Environmental Releases and Wastes: Environmental and General Population Exposures and Hazards

The conceptual model presents the exposure pathways, exposure routes, and hazards to human and ecological populations from releases and wastes from industrial and commercial uses of o-dichlorobenzene. Solid lines represent a quantitative assessment while broken lines represent a qualitative assessment.

1.2.2 Populations and Durations of Exposures Assessed

Based on the conceptual models presented in Section 1.2.1, EPA evaluated risk to environmental and human populations. Environmental risks were evaluated for acute and chronic exposure scenarios for aquatic and terrestrial species, as appropriate. Human health risks were evaluated for acute, intermediate, and chronic exposure scenarios, for (1) workers, including ONUs, via inhalation and dermal exposure routes; (2) the general population via oral and inhalation routes of exposure; and (3) consumer users via dermal and inhalation exposure routes based on reasonably available exposure and hazard data as well as the relevant populations for each.

Human populations assessed include the following:

- Workers and ONUs, including average adults and women of reproductive age;
- Consumers, including young teens (11–15 years), teenagers (16–20 years), and adults (21+ years);
  - Note that the consumer assessment does not separately evaluate exposures of bystanders to *o*-dichlorobenzene as the consumer (product user) exposure scenarios evaluated were expected to be protective of the bystander population for all age groups assessed or represented a residential exposure scenario where everyone in the home would be exposed similarly; and
- General population exposed to environmental releases, including infants, children, youths, and adults.

1.2.2.1 Potentially Exposed or Susceptible Subpopulations

TSCA section 6(b)(4)(A) requires that risk evaluations "determine whether a chemical substance presents an unreasonable risk of injury to health or the environment, without consideration of costs or other non-risk factors, including an unreasonable risk to a potentially exposed or susceptible subpopulation identified as relevant to the risk evaluation by the Administrator, under the conditions of use." TSCA section 3(12) states that "[t]he term 'potentially exposed or susceptible subpopulation' (PESS) means a group of individuals within the general population identified by the Administrator who, due to either greater susceptibility or greater exposure, may be at greater risk than the general population of adverse health effects from exposure to a chemical substance or mixture, such as infants, children, pregnant women, workers, or the elderly."

This draft risk evaluation considers PESS throughout the human health risk assessment, including throughout the exposure assessment, hazard identification, and dose-response analysis supporting this assessment. Section 4.3.5 describes how PESS considerations were incorporated into risk estimates, when possible, along with any underlying uncertainties. PESS factors can influence the selection of relevant exposure pathways, the sensitivity of derived hazard values, the identification of human subpopulations, and the discussion of uncertainties throughout the assessment. In this risk evaluation, EPA integrated and assessed available information on hazards and exposures for the COUs of *o*-dichlorobenzene, including information relevant to specific risks of injury to PESS.

1.3 Systematic Review

EPA's Office of Pollution Prevention and Toxics (EPA/OPPT) applies systematic review principles in the development of risk evaluations under the amended TSCA. TSCA sections 26(h) and (i) require EPA to use scientific information, technical procedures, measures, methods, protocols, methodologies, and models consistent with the best available science and base decisions under TSCA section 6 on the weight of scientific evidence.

To meet the TSCA section 26(h) science standards, EPA used the TSCA systematic review process described in the *Draft Systematic Review Protocol Supporting TSCA Risk Evaluations for Chemical Substances, Version 1.0: A Generic TSCA Systematic Review Protocol With Chemical-Specific Methodologies* (also called the "[2021] Draft Systematic Review Protocol") (U.S. EPA, 2021a) and in the *Draft Systematic Review Protocol for o-Dichlorobenzene* (U.S. EPA, 2026ae). Systematic review supports the risk evaluation in that data searching, screening, evaluation, extraction, and evidence integration are used to develop the exposure and hazard assessments based on reasonably available information. EPA defines "reasonably available information" to mean information that EPA possesses or can reasonably generate, obtain and synthesize for use in risk evaluations, considering the deadlines for completing the evaluation (40 CFR 702.33).

The systematic review process is briefly described in Figure 1-7 below. More detail regarding these steps is provided in the *Draft Systematic Review Protocol for o-Dichlorobenzene* (U.S. EPA, 2026ae) which provides additional information on the steps in the systematic review process including literature inventory trees and evidence maps for each discipline (*e.g.,* human health hazard) containing results of the literature search and screening, as well as sections summarizing data evaluation, extraction, and evidence integration. Initial peer-reviewed literature searches were conducted in September 2019 and updated in May 2025 for environmental release and occupational exposure; general population, consumer, and environmental exposure; and human health hazard. EPA considered the results of the initial literature search to have sufficient information on physical and chemical properties, environmental fate and transport properties, as well as environmental hazard to support this draft risk evaluation and did not proceed with an update to the peer-reviewed literature search for those disciplines. Information will be reviewed prior to the publication of the final risk evaluation and updated as appropriate.

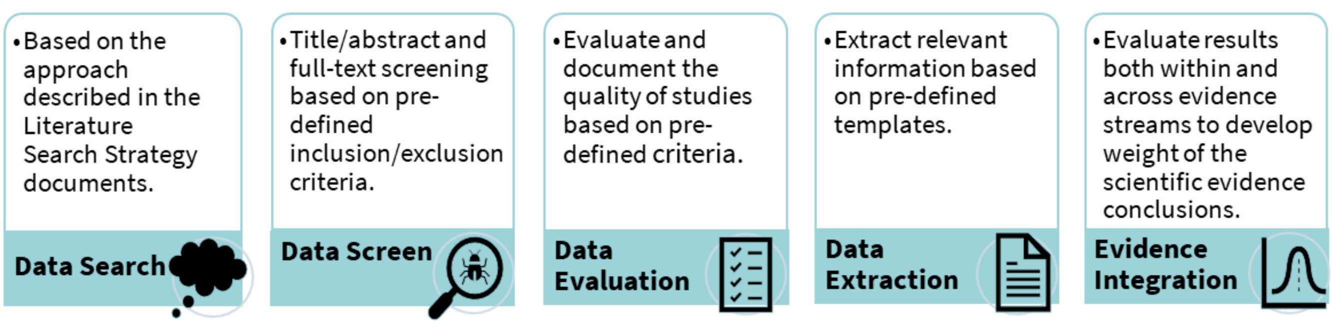

Figure 1-7. Diagram of the Systematic Review Process

EPA also identified key assessments conducted by other EPA programs and other U.S. and international organizations. Depending on the source, these assessments may include information on COUs (or the equivalent), hazards, exposures, and potentially exposed or susceptible subpopulations. For more details, see the *Draft Systematic Review Protocol for o-Dichlorobenzene* (U.S. EPA, 2026ae) that describes both the systematic review process as well as additional materials considered in the evaluation.

2 CHEMISTRY AND FATE AND TRANSPORT

EPA considered all reasonably available information identified by the Agency through its systematic review process under TSCA (U.S. EPA, 2026ae) to characterize the physical and chemical properties of *o*-dichlorobenzene (Section 2.1) as well as the environmental fate and transport of *o*-dichlorobenzene (Section 2.2). Physical and chemical properties determine the behavior and characteristics of a chemical that inform its COUs, environmental fate and transport, potential toxicity, exposure pathways, routes, and hazards. Environmental fate includes environmental partitioning, accumulation, degradation, and transformation processes. Environmental transport is the movement of the chemical within and between environmental media such as air, water, soil, and sediment. Thus, understanding the environmental fate and transport of *o*-dichlorobenzene informs the specific exposure pathways and potential human and environmental exposure that EPA considered in this draft risk evaluation.

2.1 Summary of Physical and Chemical Properties

o-Dichlorobenzene is a pale, yellow liquid with a pleasant, aromatic odor; it exists in a liquid phase at ambient temperatures (RSC, 2019; Rumble, 2018c). It has low-to-moderate solubility in aqueous systems (solubility = 141 mg/L) (U.S. EPA, 2026f; Eurofins EAG Agroscience LLC, 2022). Partitioning values for *o*-dichlorobenzene indicate low-to-moderate sorption to soil, sediment, or organic matter (log K_{OC} = 2.45; log K_{OW} = 3.38) (Rumble et al., 2018). It is a moderately volatile organic compound with a boiling point of 180.2 °C (Rumble, 2018c) and a vapor pressure of 1.35 mm Hg (Rumble, 2018a). When released to water or soil, volatilization to the surrounding atmosphere is the primary removal mechanism.

Table 2-1. Physical and Chemical Properties of *o*-Dichlorobenzene[a]

Property	Selected Value(s)	Source	Data Quality Rating
Molecular formula	$C_6H_4Cl_2$	–	–
Molecular weight	147.00 g/mol	–	–
Physical form	Pale yellow liquid with pleasant, aromatic odor	Rumble (2018c), RSC (2019)	High
Melting point	−17.2 °C	U.S. EPA (2019a)	High
Boiling point	180.2 °C	Rumble (2018c)	High
Density	1.301 g/cm^3 at 25 °C	Baragi et al. (2005)	High
Vapor pressure	1.35 mm Hg at 25°C	Rumble (2018a)	High
Vapor density	5.05 (air = 1) (unitless)	NLM (2014)	High
Water solubility	141 mg/L at 23 °C	Eurofins EAG Agroscience LLC (2022)	High
Octanol:water partition coefficient (log K_{OW})	3.38 (unitless)	Rumble et al. (2018)	High
Henry's law constant	1.9E−03 atm·m^3/mol at 25 °C	OECD (2001b)	High
Flash point	68 °C	OECD (2001b)	High
Autoflammability	648 °C	Rumble (2018a)	High
Viscosity	1.324 cP at 25 °C	Rumble (2018b)	High
Refractive index	1.5515 at 20 °C	Rumble (2018c)	High

[a] Information on the full extracted dataset is available in (U.S. EPA, 2026f)

2.2 Summary of Environmental Fate and Transport

Reasonably available environmental fate data including biotic and abiotic biodegradation rates, volatilization, and partition coefficients are parameters used in the current draft risk evaluation. In assessing the environmental fate and transport of *o*-dichlorobenzene, EPA considered the full range of results from the available highest quality data sources obtained during systematic review. Information on the full extracted dataset is available in (U.S. EPA, 2026n). Other fate estimates were based on modeling results from EPI Suite™ (U.S. EPA, 2012), a predictive tool for physical and chemical properties and environmental fate estimation.

Table 2-2. Final Environmental Fate and Transport Characteristics of *o*-Dichlorobenzene[a]

Property or Endpoint	Selected Value(s)	Source	Data Quality Rating
Direct photodegradation	Stable; not expected to undergo direct photolysis in the environment due to the lack of chromophores that absorb at wavelengths >290 nm	Kochany and Bolton (1992)	High
Indirect photodegradation (air)	12.1–13.4 days from •OH rate constant, $k = 4.2 \pm 0.2E{-}13$ cm^3/molecule-second at 20.85 ± 1 °C (assuming 12 hour day, 1.5E06 •OH /cm^3)	Wahner and Zetzsch (1981)	High
Hydrolysis	Stable; not expected to undergo hydrolysis in the environment due to the lack of hydrolysable functional groups	U.S. EPA (2009)	Medium
Photolysis in water	Not significant	Rathbun (1998)	Medium
Biodegradation in water	54 days (aerobic, groundwater, experimental)	Dermietzel and Vieth (2002)	High
	25 days (aerobic, aquifer)	Wilson et al. (1987)	High
	23.1 days (aerobic, sandy aquifer)	Nielsen et al. (1996)	High
Biodegradation in sediment/soils	11.6–34.7 days (aerobic, sandy aquifer, experimental)	Nielsen et al. (1996)	High
	39.5 days (aerobic, sandy aquifer)	Nielsen and Christensen (1994)	High
	No significant aerobic biodegradation (aerobic soil)	Brunsbach and Reineke (1994)	High
	36.9 days (anaerobic, river sediment)	Masunaga et al. (1996)	High
	36.9 days (anaerobic, river sediment)	Susarla et al. (1998)	High
	No anaerobic biodegradation (WWTP sludge)	Kirk et al. (1989)	High

Property or Endpoint	Selected Value(s)	Source	Data Quality Rating
	Transformation <25% under aerobic and anaerobic conditions (experimental)	Kuhn et al. (1985)	High
Wastewater treatment	3.72 days (aerobic)	Davis et al. (1981)	Medium
	>99.9% removal; 22% stripping, 0% sorption, 78% biodegradation (complete mix activated sludge)	Kincannon et al. (1983)	High
	Mean percent removal in 6 municipal WWTP = 87% (67–97% range)	Van Luin and Van Starkenburg (1985)	Medium
	No anerobic degradation	Kirk et al. (1989)	High
	35% removal (poor removal), biodegradation rate coeffect (K_b) = 1.8E−02 min^{-1} volatilization rate coefficient (K_v) = 2.5E−02 min^{-1}	Weber et al. (1987)	High
	65% BOD removal; 60% suspended solid removal	Union Carbide (1974)	Medium

BOD = biological oxygen demand; WWTP = wastewater treatment plant
[a] Information on the full extracted dataset is available in (U.S. EPA, 2026f).

EPA evaluated the reasonably available information to characterize the environmental fate and transport of *o*-dichlorobenzene. The key points of the fate assessment for *o*-dichlorobenzene are summarized below and listed in Table 2-2. Air is expected to be the primary environmental compartment for *o*-dichlorobenzene due to release patterns and physical and chemical properties (*i.e.*, Henry's Law constant (OECD, 2001b) and vapor pressure (Rumble, 2018a)). It is minimally degraded (half-life [$t_{1/2}$] > 1 month) via abiotic or biotic processes once in the environment ($t_{1/2}$ > 1 month) (Dermietzel and Vieth, 2002; Nielsen et al., 1996; Kirk et al., 1989; Wilson et al., 1987; Kuhn et al., 1985; Tabak et al., 1981; Tabak et al., 1964). *o*-Dichlorobenzene has moderate persistence in air ($t_{1/2}$ = 38 days), aerobic soils or sediment ($t_{1/2}$ ≈30 days), and water ($t_{1/2}$ ≈12.8 days) with limited partitioning among media once in the environment (U.S. EPA, 2026f, 2012). Estimated and measured partitioning values indicate low to moderate sorption to soil, sediment, or organic matter (log K_{OC} = 2.45 (OECD, 2001b), log K_{OW} = 3.38 (Rumble et al., 2018)). Thus, *o*-dichlorobenzene is not expected to associate strongly with airborne particulates or subsequently undergo deposition. Due to the volatility of *o*-dichlorobenzene, only small amounts are expected to enter wastewater treatment plants (WWTPs) with 35 to 99% or more subsequently removed primarily via volatilization and degradation (Kirk et al., 1989; Weber et al., 1987; Van Luin and Van Starkenburg, 1985; Kincannon et al., 1983; Davis et al., 1981; Union Carbide, 1974).

There is some potential for *o*-dichlorobenzene to bioaccumulate/bioconcentrate (BCF [bioconcentration factor] range = 0.22–19,700) (Wang et al., 2002; Wolf et al., 1991; Knezovich and Harrison, 1988; Casserly et al., 1983; Oliver and Niimi, 1983; Barrows et al., 1980), though estimates vary several orders of magnitude and elimination is expected to be rapid, limiting any sustained concentrations in organisms. Thus, no trophic transfer is expected. There is some potential for long-range transport in air, given the limited degradation pathways and persistence in air. Specifically, the characteristic travel distance (CTD) informs potential for long-range transport. The CTD was calculated using the Level III

Fugacity model in EPI Suite™ at 12,478 km. *o*-Dichlorobenzene is expected to remain largely in the vapor phase (U.S. EPA, 2012). Overall, *o*-dichlorobenzene is primarily released to air and will generally remain in air with limited partitioning or transformation, though some volatilization from water and soil will occur.

2.2.1 Weight of Scientific Evidence Conclusions for Physical and Chemical Properties and Environmental Fate and Transport

There is high confidence in the physical and chemical properties for *o*-dichlorobenzene. Measured data were identified from high-quality studies for all physical and chemical properties. A detailed discussion of strengths, limitations, assumptions, and key sources of uncertainty for the fate and transport assessment is provided in the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). There is robust evidence showing that *o*-dichlorobenzene will volatilize rapidly from soil and water surfaces, not hydrolyze significantly in water, and minimally partition to soil, sediment or organic matter. Thus, there is robust confidence in the environmental fate and transport assessment of *o*-dichlorobenzene. There is moderate evidence showing that *o*-dichlorobenzene will undergo indirect photodegradation in air, biodegrade in aerobic conditions, not biodegrade in anaerobic conditions, and not bioaccumulate in fish due to rapid elimination.

3 RELEASES AND CONCENTRATIONS IN THE ENVIRONMENT

3.1 Exposure Scenarios

3.1.1 Industrial and Commercial

EPA assessed environmental releases and occupational exposures for the COUs as described in Table 1-1. These COUs are also listed in Table 3-1. While EPA identified COUs for chemicals during the scoping phase and presented them in the final scope document (U.S. EPA, 2020d), some of the COUs changed between the scope document and the draft risk evaluation as the assessment was conducted and more information about the chemical was gathered (see Appendix D). Each COU is a unique combination of life cycle stage, category, and subcategory that describes the chemical's use. As shown in Table 1-1, EPA has identified a total of 24 COUs for *o*-dichlorobenzene.

Each COU for *o*-dichlorobenzene was assigned an occupational exposure scenario (OES) that characterizes its release and exposure potential. Although named for their utility when assessing occupational exposure, these scenarios are also used when assessing environmental releases from industrial and commercial facilities. OES is a term that describes the grouping or segmenting of COUs for assessment of releases and exposures. For example, EPA may assess a group of multiple COUs together as one OES due to similarities in release and exposure sources, worker activities, and use patterns. Alternatively, the Agency may assess multiple OESs for one COU because there are different release and exposure potentials within a given COU. OES determinations are largely driven by the availability of data and available modeling approaches to assess occupational releases and exposures. For example, even if there are similarities between multiple COUs, if there is sufficient data to separately assess releases and exposures for each COU, EPA would not group them into the same OES. For each OES, environmental releases and occupational exposure results are provided and are expected to be representative of the sites and population of workers for the given OES in the United States.

Table 3-1 shows the mapping between the COUs in Table 1-1 to the OESs assessed in this document. For *o*-dichlorobenzene, EPA mapped OESs to COUs based on information gathered during systematic review, test orders collected under TSCA section 4 (Appendix G), industry outreach, and public comments. Several of the condition of use categories and subcategories were grouped and assessed together in a single OES due to similarities in the processes or lack of data to differentiate between them. For example, the COUs with subcategories of "Importing" and "Repackaging" are both assessed under the Repackaging OES. This grouping minimized repetitive assessments. In three cases, the condition of use subcategories were further delineated into multiple OESs based on expected differences in process equipment and associated releases or exposure potentials between facilities. These cases were the COU with the subcategory of "Solvents (which become part of product formulation or mixture)", "Coatings and paints, thinners, paint removers," and "Laboratory chemicals; Cleaning and furnishing care products." At least two unique activities were identified within these COUs, and sufficient data were available to separately assess these activities, and so they each have two or three OESs assigned to them. A total of 20 unique OESs were identified for the 24 COUs. Out of the 24 COUs, 19 COUs were relevant for occupational risk, with 5 COUs relevant for consumer risk. Table 3-1 lists each COU (defined by its unique combination of a life cycle stage, category, and subcategory) and its corresponding OES(s).

Table 3-1. Crosswalk of Conditions of Use to Occupational Exposure Scenarios Assessed

Life-Cycle Stage[a]	Category[b]	Subcategory[c]	Occupational Exposure Scenario (OES)
Manufacturing	Manufacture	Domestic manufacture	Manufacturing
	Import	Import	Repackaging
Processing	Processing as a reactant	Processing as a reactant	Processing as a Reactant
	Processing – Incorporation into formulation, mixture or reaction product	Intermediates in all other basic organic chemical manufacturing	Processing as a Reactant
		Solvents (which become part of product formulation or mixture)	Incorporation into Formulation, Mixture, or Reaction Product
			Plastic Compounding
			Plastic Converting
		Soap, cleaning compound, and toilet preparation manufacturing	Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing
	Recycling	Recycling	Industrial Use of Solvents
	Repackaging	Repackaging	Repackaging
Distribution in commerce	Distribution in commerce	Distribution in commerce	Distribution in Commerce[d]
Industrial use	Solvents (which become part of product formulation or mixture)	Printing ink manufacturing; paint and coating manufacturing; Synthetic dye and pigment manufacturing	Industrial Use of Solvents
	Functional fluids (closed system)	All other basic organic chemical manufacturing	Functional Fluids (Closed System)
	Non-incorporative activities	Processing aids, not otherwise listed	Industrial Use of Solvents
Commercial use	Ink, toner, and colorant products	Ink and toners	Use of Ink, Toner, and Colorant Products
	Paints and coatings	Coatings and paints, thinners, paint removers	Use of Paints and Coatings
			Use of Paint Thinners and Removers
			Sheep Branding Fluid
	Lubricants and greases	Lubricants and greases	Use of Lubricants and Greases
	Fuels and related products	Fuel additive	Use of Fuels and Related Products
	Air care products	Continuous action air fresheners	Use in Solid Air Care Products
	Other use	Laboratory chemicals; cleaning and furnishing care products	Use of Laboratory Chemicals
			Use of Cleaning and Furnishing Care Products
			Use of Other Cleaning Products

Life-Cycle Stage[a]	Category[b]	Subcategory[c]	Occupational Exposure Scenario (OES)
Consumer use	Paints and coatings	Thinners, sheep-branding fluid	N/A[f]
	Lubricants and greases	Lubricants and greases	
	Fuels and related products	Fuel additive	
	Air care products	Continuous action air fresheners	
	Other use	Other use including ceramics glaze, and cleaning and furnishing care products	
Disposal	Disposal	Disposal	Disposal

[a] Life Cycle Stage Use Definitions (40 CFR 711.3)
- "Industrial use" means use at a site at which 1 or more chemicals or mixtures are manufactured (including imported) or processed.
- "Commercial use" means the use of a chemical or a mixture containing a chemical (including as part of an article) in a commercial enterprise providing saleable goods or services.
- "Consumer use" means the use of a chemical or a mixture containing a chemical (including as part of an article, such as furniture or clothing) when sold to or made available to consumers for their use.
- Although EPA has identified both industrial and commercial uses here for purposes of distinguishing scenarios in this document, the Agency interprets the authority over "any manner or method of commercial use" under TSCA section 6(a)(5) to reach both.

[b] These categories of condition of use (COU) appear in the life cycle diagram, reflect Chemical Data Reporting (CDR) codes, and broadly represent conditions of use of *o*-dichlorobenzene in industrial and/or commercial settings.
[c] These subcategories reflect more specific COUs of *o*-dichlorobenzene.
[d] EPA considers the activities of loading and unloading chemical products part of Distribution in commerce; however, these activities were assessed as part of each COU's OES. EPA's current approach for assessing releases and exposures for the remaining aspects of distribution in commerce includes searching Department of Transportation (DOT) and National Response Center (NRC) data for incident reports pertaining to *o*-dichlorobenzene distribution.
[f] Consumer uses are not assigned to an OES as they are not part of the occupational assessment. See Section 4.3.7.2 for information on the consumer exposure assessment.

After identifying those OESs that will be assessed, the next step was to describe the function of *o*-dichlorobenzene within each OES. This information is utilized in mapping release and exposure data to an OES as well as applying modeling approaches. Table 3-2 is a summary; for more information on each OES see the corresponding process descriptions in Section 4.3 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

Table 3-2. Description of the Function of *o*-Dichlorobenzene for Each OES

OES	Role/Function of *o*-Dichlorobenzene
Manufacturing	This OES captures the Manufacturing COU category. *o*-Dichlorobenzene is unintentionally manufactured as a byproduct during the production of vinyl chloride monomer (VCM) (Exponent Inc., 2024). In this process, *o*-dichlorobenzene is separated from the intended product and managed as waste via incineration. *o*-Dichlorobenzene may also form as a byproduct in other manufacturing (*e.g.*, certain herbicides, 3,4-dichloroaniline, and polyurethane-related isocyanates; EPA-HQ-OPPT-2018-0444-0013). Preliminary review of 2024 CDR data indicates that *o*-dichlorobenzene has also

OES	Role/Function of *o*-Dichlorobenzene
	been domestically manufactured as a primary product in recent years. While the Manufacturing OES in this draft risk evaluation focuses on manufacture as a byproduct, EPA intends to incorporate 2024 CDR data and other reasonably available information regarding domestic manufacture of *o*-dichlorobenzene into the final risk evaluation.
Repackaging	This OES captures the Import and Repackaging COU categories. Import and repackaging sites are expected to distribute *o*-dichlorobenzene to various downstream uses. *o*-Dichlorobenzene is shipped as a bulk liquid at ambient temperature and pressure by highway and rails, and as packaged hazardous material for smaller-volume distribution.
Processing as a Reactant	This OES captures the Processing as a reactant COU category. *o*-Dichlorobenzene functions as a feedstock and key intermediate in the synthesis of downstream products from the basic organic chemical manufacturing sector. Regulatory sources identified its reactant use for manufacturing herbicide intermediates (*e.g.*, precursors to 3,4-dichloroaniline compounds), producing dyes, and as a chemical intermediate in chlorinated aromatic chemistry.
Incorporation into Formulation, Mixture, or Reaction Product	This OES captures part of the Solvents (which become part of product formulation of mixture) COU subcategory within the Processing life cycle stage. Incorporation into a formulation, mixture or reaction product refers to the process of mixing or blending of several raw materials to obtain a single product or preparation. EPA identified Incorporation into a formulation, mixture, or reaction product as a use of *o*-dichlorobenzene due to *o*-dichlorobenzene's presence in products such as lubricating oils, fuel additives, paints, coatings, paint thinners, inks, cleaning products, functional fluids, laboratory standards, and solvents
Plastic Compounding	This OES captures part of the Solvents (which become part of product formulation of mixture) COU subcategory within the Processing life cycle stage. *o*-Dichlorobenzene may be present at residual amounts when *p*-dichlorobenzene is used to make polyphenylene sulfide (PPS) resin. PPS resin contains less than 100 ppm of residual *p*-dichlorobenzene (ACC, 2023), and thus would contain even less *o*-dichlorobenzene. Residual *o*-dichlorobenzene is then incorporated into the downstream product during plastic compounding.
Plastic Converting	This OES captures part of the Solvents (which become part of product formulation of mixture) COU subcategory within the Processing life cycle stage. *p*-Dichlorobenzene is used to make PPS resin, which contains less than 100 ppm of residual *p*-dichlorobenzene (ACC, 2023), and even less residual *o*-dichlorobenzene. This residual *o*-dichlorobenzene is then incorporated into the downstream product during plastic compounding (prior OES), and then converted into finished products during plastic converting.

OES	Role/Function of *o*-Dichlorobenzene
Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing	This OES captures the Soap, cleaning compound, and toilet preparation manufacturing COU subcategory. EPA identified this as a use due to *o*-dichlorobenzene's presence in soap, cleaning compounds, and air care products.
Industrial Use of Solvents	This OES captures the Industrial use categories of Solvents (which become part of product formulation or mixture), and Non-incorporative activities, as well as the Processing category of Recycling. *o*-Dichlorobenzene is considered as a high-boiling organic solvent in industrial operations due to its strong solvency for hydrophobic chemicals and functional property stability. *o*-Dichlorobenzene dissolves, extracts, cleans, or facilitates processing of other chemicals in enclosed systems such as mixing vessels, separation units, cleaning equipment, and formulation tanks.
Distribution in Commerce	This OES captures the Distribution in commerce COU category. *o*-Dichlorobenzene is expected to be distributed in commerce for the purposes of each processing, industrial, and commercial use of the chemical. EPA expects *o*-dichlorobenzene to be transported from manufacturing sites to downstream processing and repackaging sites.
Functional Fluids (Closed System)	This OES captures the Functional fluids (closed system) COU category. *o*-Dichlorobenzene is used in a mixture with *p*-dichlorobenzene as a coolant in a closed system in the manufacture of some organic chemicals.
Use of Ink, Toner, and Colorant Products	This OES captures the Ink, toner, and colorant products COU category within the Commercial use life cycle stage. *o*-Dichlorobenzene is used as a solvent in the pigment manufacturing process, though is stripped away before the final industry pigment product is produced. While not present intentionally, *o*-dichlorobenzene may appear in pigments due to this solvent use. At most, *o*-dichlorobenzene may be present in pigments at parts per million levels (EPA-HQ-OPPT-2018-0444-0024).
Use of Paints and Coatings	This OES captures part of the Coatings and paints, thinners, paint removers COU subcategory within the Commercial use life cycle stage. *o*-Dichlorobenzene has been reported as a constituent within products or formulations for the manufacture, operation, and maintenance of aerospace products. More specifically it was reported as a component of precious metal inks that can be brushed onto a substrate. *o*-Dichlorobenzene is also used as an ingredient in some specialized metallic coatings for ceramics, functioning within the coating as a solvent at concentrations between 5 and 10% (Duncan Enterprises, 2005). It also may be present at low levels within pigments due to its use as a solvent during the manufacturing process of some pigments (more specifically, Pigment

OES	Role/Function of *o*-Dichlorobenzene
	Violet 23).
Use of Paint Thinners and Removers	This OES captures part of the Coatings and paints, thinners, paint removers COU subcategory within the Commercial use life cycle stage. *o*-Dichlorobenzene has been reported as a constituent within products or formulations for the manufacture, operation, and maintenance of aerospace products. More specifically it was reported as a component of a formulation of paint stripper.
Sheep Branding Fluid	This OES captures part of the Coatings and paints, thinners, paint removers COU subcategory within the Commercial use life cycle stage. *o*-Dichlorobenzene has been reported as a constituent within sheep branding fluid, which is a washable paint used by farmers to identify sheep on a farm. *o*-Dichlorobenzene may be present in this product at concentrations of up to 10 to 30% (Heiniger Australia Pty Ltd, 2016).
Use of Lubricants and Greases	This OES captures the Lubricants and greases COU category within the Commercial use life cycle stage. *o*-Dichlorobenzene has been reported as a component of automotive engine oils, and oils used to maintain tools. A single relevant product was identified, and *o*-dichlorobenzene is indicated to be present at 0.12% (EPA-HQ-OPPT-2018-0446-0028).
Use of Fuels and Related Products	This OES captures the Fuels and related products COU category within the Commercial use life-cycle stage. *o*-Dichlorobenzene was indicated to be present in some fuel additive products that are marketed to the aerospace community but not widely used. A single relevant product was identified in which *o*-dichlorobenzene is present in the products at 0.12% (EPA-HQ-OPPT-2018-0446-0028).
Use in Solid Air Care Products	This OES captures the Air care products COU category within the Commercial use life-cycle stage. *o*-Dichlorobenzene may be present in air car products such as antimicrobial products, bathroom cleaners, urinal and toilet deodorants, and deodorizing wall blocks at concentrations of up to 1% (Willert Home Products, 2019).
Use of Laboratory Chemicals	This OES captures part of the Laboratory chemicals; Cleaning and furnishing care products COU subcategory within the Commercial use life cycle stage. EPA has identified several cases of *o*-dichlorobenzene in use as a laboratory chemical as a reference sample for analysis of material samples and in laboratory applications for analytical standards, research, equipment calibration and sample preparation. Several products intended for laboratory use were also found, indicating *o*-dichlorobenzene may be present in neat form.
Use of Cleaning	This OES captures part of the Laboratory chemicals; Cleaning and furnishing

OES	Role/Function of *o*-Dichlorobenzene
and Furnishing Care Products	care products COU subcategory within the Commercial use life cycle stage. *o*-Dichlorobenzene was identified in some cleaning and washing agents as recently as 2012 (SPIN, 2020), and in products within dry-cleaning facilities at concentrations of up to 95% (OECD, 2001a).
Use of Other Cleaning Products	This OES captures part of the Laboratory chemicals; Cleaning and furnishing care products COU subcategory within the Commercial use life cycle stages. *o*-Dichlorobenzene was identified in some cleaning products including one septic tank cleaner that indicates the presence of *o*-dichlorobenzene at concentrations greater than 99% (Utility Wonder Products, 2014).
Disposal	This OES captures the Disposal COU category. Each of the OESs may generate waste streams of *o*-dichlorobenzene that are collected and transported to third-party sites for disposal or treatment, and these cases are assessed under this OES.

3.1.2 Consumer and Commercial (Down-the-Drain)

EPA acknowledges there may be environmental releases of *o*-dichlorobenzene from consumer and commercial products containing *o*-dichlorobenzene via the end-of-life disposal and demolition of products in the built environment (for example, foam insulation). Additionally, disposal of products containing *o*-dichlorobenzene via down-the-drain release of *o*-dichlorobenzene can occur when users wash their hands or other product-applying tools in a sink. These products can also be disposed when users no longer have use for them, or products become expired and are thrown into garbage or taken directly to landfills. Other down the drain releases of *o*-dichlorobenzene can occur with products like toilet bowl deodorizers which may slowly release *o*-dichlorobenzene down the drain into sewers when a toilet is flushed. EPA acknowledges that these releases to the environment can occur; however, the Agency does not consider the disposal or down the drain COUs as pathways of concern from a consumer or commercial perspective because of the high volatility of *o*-dichlorobenzene and limited persistence in water (U.S. EPA, 2026f). The physical and chemical information (*i.e.*, solubility, volatility) further supports the down the drain pathway is not a pathway of concern due to high wastewater treatment removal (80–99%) (Matter-Müller et al., 1980). In addition, EPA's review of monitoring data from the Water Quality Portal (WQP) found over 99% of samples with non-detectable levels of *o*-dichlorobenzene in surface water and groundwater samples (U.S. EPA, 2026af). In the 2021 to 2023 Toxics Release Inventory (TRI), all land releases were to underground injection and none to landfills (U.S. EPA, 2018b).

3.2 Summary of Environmental Releases

3.2.1 Industrial and Commercial

EPA's first source of information to estimate releases from each OES is programmatic databases (*i.e.*, TRI and Discharge Monitoring Report [DMR]; Table 3-3). These databases provide annual facility releases, from which daily release estimates are obtained by dividing the annual release by the number of expected release days. Number of release days may be obtained through literature or through assumptions based on generic industry information, often from emission scenario documents (ESDs) or generic scenarios (GSs).

Once these data are obtained from the databases, each facility is mapped to one of the OESs described in Section 3.1. After mapping is complete, each OES may have release data from multiple facilities. These data are considered together to inform the releases that are expected to occur due to the OES. There are cases when there are few or no facilities mapped to a given OES. The handling of these cases is explained below.

For the *o*-dichlorobenzene release assessment, EPA used a tiered approach for assessing environmental releases using TRI from 2019 to 2023 (U.S. EPA, 2023c) and DMR from 2019 to 2023 (U.S. EPA, 2023b). The first tier of this approach included an assessment of the risk to the general population and the environment from all releases reported to TRI from 2019 to 2023. The highest releasing facility from the DMR database (TotalEnergies Petrochemicals & Refining Inc - Port Arthur Refinery which uses *o*-dichlorobenzene as a solvent) was also considered as described in Section 5.3.1. This release, along with releases reported to TRI, are expected to be the largest sources of *o*-dichlorobenzene in the environment.

In the case of *o*-dichlorobenzene, MOEs were not below benchmarks for the environment or the general population due to the releases reported to TRI, or the highest release reported to DMR. Due to this, EPA did not estimate releases from other OESs as they are expected to have lower releases of *o*-dichlorobenzene than releases that would be required to report to TRI. Release data collected from TRI can be found summarized for each OES in Section 4.3 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). Releases from DMR and TRI can be found summarized in the water and air release supplemental files (U.S. EPA, 2026c, 2026ag).

The number of facilities were obtained through programmatic data, literature, or through assumptions and modeling based on Bureau of Labor Statistics (BLS)[2] and Statistics of U.S. Businesses (SUSB)[3] data. A summary of releases from TRI and DMR, the primary datasets used in the risk evaluation, are displayed in Table 3-3. A summary of releases to other databases can be found in supplemental files (U.S. EPA, 2026c, y, 2026ag).

Table 3-3. Summary of *o*-Dichlorobenzene Environmental Releases from TRI and DMR (2019–2023) by Occupational Exposure Scenario

OES	Media	Estimated Annual Release Range Across Sites (kg/yr) [a]		No. of Release Days	Estimated Daily Release Range Across Sites (kg/day) [a]		No. of Facilities (and Data Points)	Source[b]
		Central Tendency	High-End		Central Tendency	High-End		
Manufacturing[c]	Air (fugitive)	4.1	6.0	350	1.2E−02	1.7E−02	1 (3)	TRI
	Air (stack)	136	146	350	0.39	0.42	1 (5)	TRI
	Water (surface)	0.45	2.3	350	1.3E−03	6.5E−03	1 (5)	TRI
	Water (surface)	0.45	21	350	1.3E−03	6.1E−02	1 (5)	DMR
Repackaging	Water (surface)	0.50	0.83	350	2.4E−03	4.8E−04	2 (2)	DMR
Processing as a Reactant	Water (surface)	3.3	12	350	9.5E−03	3.3E−02	2 (5)	DMR

[2] https://www.bls.gov/ ; accessed July 29, 2026.
[3] https://www.Census.gov/programs-surveys/susb.html; accessed July 29, 2026.

OES	Media	Estimated Annual Release Range Across Sites (kg/yr) [a]		No. of Release Days	Estimated Daily Release Range Across Sites (kg/day) [a]		No. of Facilities (and Data Points)	Source[b]
		Central Tendency	High-End		Central Tendency	High-End		
Industrial Use of Solvents	Air (fugitive)	581	5,150	350	1.7	15	3 (14)	TRI
	Air (stack)	5.9	3,510	350	1.7E−02	10.0	4 (17)	TRI
	Water (surface)	2.7		350	7.8E−03		1 (1)	TRI
	Water (discharges to POTW)	5.4E−02	0.454	350	1.6E−04	1.3E−03	2 (3)	TRI
	Water (surface)	0.45	9.5	350	1.3E−03	2.7E−02	26 (51)	DMR
Disposal	Air (fugitive)	0.11	11	350	3.2E−04	3.2E−02	13 (41)	TRI
	Air (stack)	0.45	31	350	1.3E−03	9.0E−02	10 (34)	TRI
	Land (on-site)	3,280	1.1E04	350	9.4	31	1 (5)	TRI
	Land (off-site)	1.9	4.8	350	5.4E−03	1.4E−02	4 (6)	TRI
	Water (surface)	0.166	40	350	4.7E−04	0.114	19 (36)	DMR

DMR = Discharge Monitoring Report; OES = occupational exposure scenario; TRI = Toxics Release Inventorty

[a] Annual and daily releases are provided as central tendency and high-end estimates, which are typically estimated, for datasets with 6+ points, by taking the 50th and 95th percentiles respectively of release data from all facilities within the OES. For datasets with three to five data points, EPA estimated central tendency exposure using the 50th percentile and the maximum as the high-end release point. For datasets with 2 data points, EPA estimated the central tendency using the midpoint value and the higher of the 2 values as the high-end. Finally, for datasets with only 1 data point, EPA presented the single release value.

[b] 2019–2023 TRI and DMR data (U.S. EPA, 2026c, y, 2026ag)

[c] *o*-Dichlorobenzene is domestically manufactured including as a byproduct during the production of other chemicals such as vinyl chloride monomer.

3.2.1.1 Weight of Scientific Evidence Conclusions for Environmental Releases from Industrial and Commercial Sources

Table 3-4 summarizes the weight of scientific evidence ratings for each media of release for each OES. For more detail, see Section 4.4.1 in the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

Table 3-4. Summary of Assumptions, Uncertainty, and Overall Weight of Scientific Evidence Conclusions in Environmental Release Estimates by Occupational Exposure Scenario

OES	Weight of Scientific Evidence Rating
Manufacturing	Environmental releases to air were assessed using reported releases from 2019–2023 Toxics Release Inventory (TR)I (U.S. EPA, 2026c), which received a medium rating in EPA's systematic review. Releases to water from Discharge Monitoring Report (DMR) data from 2019–2023 (U.S. EPA, 2026ag) were also considered but not expected to be significant due to the screening level assessments (see Sections 4.3.4 and 5.1.2). DMR received a high rating from EPA's systematic review process. No releases to land for this occupational exposure scenario (OES) were reported. The assessment of release data from multiple EPA environmental release reporting

OES	Weight of Scientific Evidence Rating
	databases increases confidence in release estimates. Furthermore, these data capture environmental releases from four manufacturing facilities that potentially manufacture *o*-dichlorobenzene as a byproduct in their chemical manufacturing process. Facilities that indicated the release of *o*-dichlorobenzene and were seen to produce vinyl chloride monomer (VCM) or indicated in TRI that the chemical's presence is due to its manufacture as a byproduct, were categorized into this OES. Because the programmatic data provide a holistic assessment of releases from manufacturers of *o*-dichlorobenzene, there is increased confidence that the release data cover all known manufacturing releases in the United States. As discussed above, the main strength of the analysis includes using industry reported release data to various EPA databases. However, the limitations of the analysis include the uncertainties discussed above, such as the temporal relevancy of the release data compared to the current year. Therefore, EPA concluded that the weight of scientific evidence for this assessment is moderate to robust, considering the strengths and limitations of reasonably available data.
Repackaging	See footnote[a]
Processing as a Reactant	Environmental releases to air, water, and land were assessed using reported releases from 2019–2023 TRI (U.S. EPA, 2026c, y, 2026ag), which received a medium rating in EPA's systematic review. Releases to water from DMR data from 2019–2023 (U.S. EPA, 2026ag) were also considered but not expected to be significant due to the screening-level assessments (see Sections 4.3.4 and 5.1.2). DMR received a high rating from EPA's systematic review process. The assessment of release data from multiple EPA environmental release reporting databases increases confidence in release estimates. Furthermore, these data capture environmental releases from three processing sites. Because the programmatic data provide a holistic assessment of releases from the processing of *o*-dichlorobenzene, there is increased confidence that the release data cover all known processing releases in the United States. The main strength of the analysis includes using industry reported release data to various EPA databases. However, the limitations of the analysis include the temporal relevancy of the release data compared to the current year. Therefore, EPA concluded that the weight of scientific evidence for this assessment is moderate to robust, considering the strengths and limitations of reasonably available data.
Incorporation into Formulation, Mixture, or Reaction Product	See footnote [a]
Plastic Compounding	
Plastic Converting	
Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing	
Industrial Use of Solvents	Environmental releases to air, water, and land were assessed using reported releases from 2019–2023 TRI (U.S. EPA, 2026c, y, 2026ag), which received a

OES	Weight of Scientific Evidence Rating
	medium rating in EPA's systematic review. Releases to water from DMR data from 2019–2023 (U.S. EPA, 2026ag) were also considered but not expected to be significant due to the screening level assessments (see Sections 4.3.4 and 5.1.2). DMR received a high rating from EPA's systematic review process. The assessment of release data from multiple EPA environmental release reporting databases increases confidence in release estimates. Furthermore, these data capture environmental releases from 30 sites that use *o*-dichlorobenzene as a solvent. Because the programmatic data provide a holistic assessment of releases from this use of *o*-dichlorobenzene, there is increased confidence that the release data cover all known releases in the United States. The main strength of the analysis includes using industry reported release data to various EPA databases. However, the limitations of the analysis include the temporal relevancy of the release data compared to the current year. Therefore, EPA concluded that the weight of scientific evidence for this assessment is moderate to robust, considering the strengths and limitations of reasonably available data.
Functional Fluids	See footnote [a]
Use of Ink, Toner, and Colorant Products	
Use of Paints and Coatings	
Use of Paint Thinners and Removers	
Sheep Branding Fluid	
Use of Lubricants and Greases	
Use of Fuels and Related Products	
Use in Solid Air Care Products	
Use as Laboratory Chemical	
Use of Cleaning and Furnishing Care Products	
Use of Other Cleaning Products	
Disposal	Environmental releases to air and land were assessed using reported releases from 2019 to 2023 TRI (U.S. EPA, 2026c, y), which received a medium rating in EPA's systematic review. Releases to water from DMR data from 2019–2023 (U.S. EPA, 2026ag) were also considered but not expected to be significant due to the screening level assessments (see Sections 4.3.4 and 5.1.2). DMR received a high rating from EPA's systematic review process.

OES	Weight of Scientific Evidence Rating
	The assessment of release data from multiple EPA environmental release reporting databases increases confidence in release estimates. Furthermore, these data capture environmental releases from 35 disposal sites. Because the programmatic data provide a holistic assessment of releases from the disposal of *o*-dichlorobenzene, there is increased confidence that the release data cover all known disposal releases in the United States. The main strength of the analysis includes using industry reported release data to various EPA databases. However, the limitations of the analysis include the temporal relevancy of the release data compared to the current year. Therefore, EPA concluded that the weight of scientific evidence for this assessment is moderate to robust, considering the strengths and limitations of reasonably available data.
[a] There were no release data for air, water, or land in the release databases from facilities that use *o*-dichlorobenzene for this purpose. Consequently, EPA provided a qualitative assessment of releases. It is expected that releases to air, water, and land from this OES will be less than processing uses, otherwise they would have been reported to the release databases. Due to this, there is increased confidence in the qualitative assessment of releases from facilities that use *o*-dichlorobenzene for this OES. The strengths of the qualitative analysis include the comparison with processing data that is expected to be higher. However, the limitations of the analysis include the lack of directly applicable release data. Therefore, EPA concluded that the weight of scientific evidence for this assessment is moderate, considering the strengths and limitations of reasonably available data.	

3.3 Summary of Concentrations of *o*-Dichlorobenzene in the Environment

3.3.1 Environmental Media

3.3.1.1 Air

EPA evaluated Air Quality System (AQS) monitoring data (U.S. EPA, 2026b) for samples collected from January 2019 through December 2023 to align monitoring data with the TRI 2019 to 2023 release data evaluated in this assessment (U.S. EPA, 2026x). The *o*-dichlorobenzene monitoring data included over 31,000 24-hour sampling entries. Ambient air *o*-dichlorobenzene monitored concentrations from the AQS database ranged from non-detect to 23.1 µg/m^3 with mean concentrations of 0.008 to 0.032 µg/m^3 across the years. A total of 77.4% of samples reported concentrations as zero.[4] The method detection limit (MDL) from AQS was not reported.

Indoor air concentrations extracted from peer-reviewed literature through systematic review ranged from ND to 73.05 µg/m^3 (Li et al., 2019; Chin et al., 2014; NYIEQ, 2005; Lindstrom et al., 1995) (detection limit = 0.01 µg/m^3). See Section 5.2 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for more details.

3.3.1.2 Water and Sediment

Surface water monitoring data from the Water Quality Portal (WQP) indicate that 99.6% of all *o*-dichlorobenzene surface water samples were either below detection limits (245 samples, <0.50 µg/L), below reporting limit (11 samples, <0.50 µg/L), not detected (2,561 samples, <0.50 µg/L), or present

[4] Air Qualtiy System dataset does not report the MDL or samples as less than MDL or non-detects (NDs); these values are reported as zeros.

below quantification limit (212 samples, <0.50 μg/L) (U.S. EPA, 2026f). The dataset included 16,276 samples (3,029 surface water samples; 13,247 groundwater samples) from across the United States collected between 2019 and 2025. The highest detection limit across surface water monitoring data was 0.5 μg/L with one surface water sample having *o*-dichlorobenzene measured at the detection limit. No surface water samples had *o*-dichlorobenzene measured above detection limits. Similarly, all sediment samples (100% of 525 samples) from the WQP database measured *o*-dichlorobenzene at or below detection limits with a maximum detection limit of 0.17 μg/L. Wastewater effluent monitoring data from the WQP were below detection limits (<0.50 μg/L). Specifically, 100% of all *o*-dichlorobenzene effluent samples were below detection limits (8 samples) with a maximum detection limit of 0.15 μg/L (also see the supplemental file *Water Quality Portal (WQP) Results for o-Dichlorobenzene and p-Dichlorobenzene* (U.S. EPA, 2026af)).

Surface water concentrations extracted from peer-reviewed literature through systematic review ranged from ND to the highest detection limit of 13.3 μg/L (Coiner et al., 2010; Chen and Zoltek, 1995), and sediment concentrations ranged from below detection to 3.03 ng/g dry weight (Yun and Kannan, 2011; Coiner et al., 2010). The detection limit for sediment is 0.02 ng/g, Wastewater concentrations ranged from ND to 48 μg/L, with a detection limit of 0.5 μg/L (Conn et al., 2006; Sauer and Tyler, 1996). *o*-Dichlorobenzene was not detected in drinking water studies (detection limit = 0.048 μg/L) (Hopple et al., 2009; Kingsbury et al., 2008). See Section 5.3 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for more details.

3.3.1.3 Land

From the WQP database, 99.6% of groundwater samples were at or below detection limits (0.5 μg/L *o*-dichlorobenzene) (supplemental file *Water Quality Portal (WQP) Results for o-Dichlorobenzene and* p-*Dichlorobenzene* (U.S. EPA, 2026af)). Soil concentrations extracted from peer-reviewed literature through systematic review ranged from ND to 17 μg/kg (detection limit = 5 ng/g) (Yun and Kannan, 2011; Jang and Townsend, 2001), and groundwater concentrations ranged from ND to 95 μg/L (detection limit = 0.20 μg/L) (Yun and Kannan, 2011; Jang and Townsend, 2001). See Section 5.4 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for more details.

3.3.2 Weight of Scientific Evidence Conclusions for Environmental Concentrations

AQS data have been previously reviewed with quality assurance steps to ensure data quality and certified in accordance with 40 CFR 58.15. Due to strictly regulated monitoring requirements, EPA has high confidence in the AQS ambient air dataset (U.S. EPA, 2026b), which also received a high-quality rating from EPA's systematic review process for *o*-dichlorobenzene (U.S. EPA, 2026ae). A primary limitation of the AQS data, and other monitoring data, is that because the data have not been annualized, they represent a diverse collection of sampling durations (none of which are annual averages), which are not directly comparable to modeled data. Additionally, because monitoring data represents a total aggregate concentration from all sources of *o*-dichlorobenzene contributing to ambient air concentrations, monitoring data cannot be used to characterize exposures exclusively from sources associated with COUs.

The WQP contains data from the Water Quality Exchange (WQX). Many data fields in WQX are highly variable to accommodate the many original sources of data that WQX captures. The data also provide results based on different analytical methods and study goals (U.S. EPA, 2018a). WQX data are often not nationally representative, and the data often overlap with nationally representative water data such as U.S. Geological Survey's (USGS) National Water Quality Assessment (NAWQA). NAWQA provides current conditions and water quality with the information stored in National Water Information System

(NWIS). Because NWIS data reflects that *o*-dichlorobenzene is typically not detected above the detection limit in surface water or groundwater, EPA has robust confidence that in areas lacking data, which are mainly areas associated with lower releases, *o*-dichlorobenzene will not be present in the water. In addition, based on the physical and chemical properties of *o*-dichlorobenzene and low release quantities to water and land, EPA has confidence that the conclusions drawn from the WQP data can be applied across the United States even in areas where monitoring data are not available. Furthermore, WQP is not specific to TSCA COUs.

The *o*-dichlorobenzene media concentrations (air, water, sediment, and soil) from systematic review were extracted from multiple studies, primarily from the United State. All media types included studies and data collected in the United States with ratings of medium- or high-quality, which are representative of exposure for the U.S. general population. See the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for study ratings for all peer-reviewed literature from systematic review. Notably, measured data from systematic review vary temporally and spatially, and media concentrations are especially subject to seasonal variation. Methodology for sample collection and analysis are specific to each peer-reviewed literature and vary with instrumentation and analysis. Concentrations of *o*-dichlorobenzene across all media are attributed to many different sources, including but not limited to facility emissions, consumer activities, and environmental sources, and are not specific to only COUs.

4 HUMAN HEALTH RISK ASSESSMENT

_o_-Dichlorobenzene – Human Health Risk Assessment: Key Points

EPA evaluated all reasonably available information to support human health risk characterization of *o*-dichlorobenzene for workers, occupational non-users (ONUs), and consumers, as well as the general population exposed to ambient air releases and drinking water.

Hazard Key Points

- EPA identified respiratory and liver toxicity as the primary non-cancer hazards of *o*-dichlorobenzene.
  - The most sensitive inhalation hazard endpoint is respiratory toxicity human equivalent concentration (HEC) of 0.45 ppm across acute, intermediate, and chronic exposures, with a total uncertainty factor of 30. The HEC is based on a transcriptomic point of departure (tPOD) derived from a 5-day inhalation transcriptomics study conducted by the National Institute of Environmental Health Sciences (NIEHS).
  - For oral and dermal exposures, the most sensitive endpoint is liver toxicity, with a human equivalent dose (HED) of 11 mg/kg-day and an uncertainty factor of 30 applied to all exposure durations. This value is supported by a tPOD derived from a 5-day inhalation transcriptomics study conducted by NIEHS.
  - Adequate dermal toxicity studies were not available, so oral hazard values were applied to dermal exposure, with absorption differences accounted for in the exposure assessment.
  - EPA has robust confidence in the liver and respiratory toxicity PODs because each are supported by co-critical hazard values from related endpoints in two other studies.
- There is insufficient evidence from cancer bioassays to evaluate *o*-dichlorobenzene carcinogenicity using standard approaches; EPA applied a weight of scientific evidence approach using the ReCAAP (Rethinking Chronic Toxicity and Carcinogenicity Assessment for Agrochemicals Project) framework and concluded that quantitative cancer risk assessment is not warranted.
  - Accordingly, EPA did not identify a cancer hazard or derive a cancer hazard value for *o*-dichlorobenzene. Cancer risk was therefore not estimated for workers, consumers, or the general population.

Occupational Exposure Key Points

- Where available, EPA used directly applicable inhalation monitoring data to evaluate acute, intermediate, and chronic exposures to workers and ONUs for each occupational exposure scenario (OES). Where no monitoring data existed relevant to certain OESs, analogous monitoring data or models were used.
- EPA evaluated acute, intermediate, and chronic exposures for workers and ONUs across OESs using three evidence streams: inhalation monitoring (8 OESs), analogous/surrogate monitoring (6 OESs), and inhalation modeling (6 OESs).
- EPA modeled worker dermal exposure to liquid *o*-dichlorobenzene in 17 out of 20 OESs using a fractional absorption approach. The remaining three OESs did not receive a quantitative dermal assessment due to low expected exposure.
- EPA's assessment indicates MOEs below the benchmark MOE for 13 of 20 OESs, with the highest inhalation and dermal risk during Repackaging; Processing OESs (As a Reactant, Incorporation into Soaps/Cleaners/Toilet Preparation Manufacturing, and Incorporation into Formulations/Mixtures/Reaction Products); Use of Paints and Coatings; Use of Cleaning and Furnishing Care Products; and Use of Other Cleaning Products.

_o_-Dichlorobenzene – Human Health Risk Assessment: Key Points (_Continued_)

Consumer Exposure Key Points

- Lubricants/greases and building construction product air concentrations were modeled using the Consumer Exposure Model (CEM).
    - Acute and chronic margins of exposure (MOEs) were calculated using the respective HECs compared to the benchmark of 30.
    - Because the MOEs for all scenarios were above the benchmark, there is no expectation of non-cancer risks to consumers from dermal exposure to *o*-dichlorobenzene-containing consumer products.
- Dermal doses were calculated using the permeability and fractional absorption methods. Non-cancer risks to consumers from dermal exposure are not expected.

General Population Exposure Key Points

- The routes of exposure considered were ambient air inhalation and drinking water oral exposure.
- All screening-level risk estimates for ambient air inhalation were above the non-cancer benchmark using the Indoor-Outdoor Air Calculator (IIOAC) based on facility releases reported to the Toxics Release Inventory (TRI) between 2019 to 2023. Non-cancer risks to the general population from TRI facility releases are not expected.
- All drinking water risk estimates for adults and infants were above the non-cancer benchmark. Non-cancer risks to the general population from treated drinking water, untreated surface water, or groundwater as a primary source for drinking water are not expected.

4.1 Summary of Human Exposures

EPA evaluated all reasonably available information for occupational, consumer, and general population exposure to *o*-dichlorobenzene, including consideration of the potential for increased exposure or susceptibility across PESS. The key areas of human exposure assessment included:

- inhalation (Section 4.1.1.1) and dermal exposures (Section 4.1.1.2) for workers and ONUs, as appropriate, for each OES (Section 4.1.1);
- inhalation (Section 4.1.2.1) and dermal exposures (4.1.2.2) for consumers, as appropriate, for each COU in scenarios that represent a range of use patterns and behaviors; and
- ambient air inhalation (Section 4.1.3.2) and drinking water oral exposures (Section 4.1.3.3) for the general population.

4.1.1 Occupational Exposures

4.1.1.1 Summary of Inhalation Exposure Assessment

EPA's general approach for estimating occupational exposures and the specific basis for each estimate is discussed in the *Draft Chemistry, Fate, Release and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). The Agency used inhalation exposure estimates obtained from air monitoring or modeling to evaluate acute, intermediate, and chronic exposures to workers and ONUs for each OES. Workers are expected to directly handle the chemical while ONUs are expected to be in the same area as the chemical but are assumed to not directly handle *o*-dichlorobenzene. Acute exposures occur over the course of a single working day, intermediate exposure occurs over one working month (a maximum of 22 working days out of 30), and chronic exposure occurs over the worker's working years (representing yearly average exposure over 31 years at central tendency and 40 years at high-end). It is assumed a worker will work no more than 250 days per year. For *o*-dichlorobenzene, inhalation monitoring data and test order information indicates that worker populations include 8- and 12-hour shifts, each with distinct exposures suggesting that they represent subsets of similarly exposed groups (SEGs).

EPA used *o*-dichlorobenzene-specific inhalation monitoring data for 6 of the 20 OESs (Table 4-1). Where no *o*-dichlorobenzene-specific monitoring data existed relevant to certain OESs, analogous monitoring data were used. Analogous monitoring data refers to data from the same chemical but for a different yet similar activity or OES. Analogous data from other OESs were used for two OESs, Repackaging as well as Functional Fluids (Closed System). Surrogate data from other chemicals were used for six OESs. Probabilistic modeling was performed for one OES (Use of Lubricants and Greases) and GS/ESDs were used to assess exposures for three OESs (Use of Paints and Coatings, Use of Fuels and Related Products, and Use in Solid Air Care Products) where no air monitoring data were available. EPA's Consumer Exposure Model (CEM) was adjusted for occupational use when no monitoring data were available for two OESs (Use in Solid Air Care Products, and Sheep Branding Fluid).

When using inhalation monitoring data, the determination of central tendency and high-end exposures depended on the size of the dataset. For datasets with six or more data points, EPA estimated central tendency and high-end exposures using the 50th percentile and 95th percentile. For datasets with three to five data points, EPA estimated central tendency exposure using the 50th percentile and the maximum as the high-end exposure estimate. For datasets with two data points, EPA estimated the central tendency using the midpoint value and the higher of the two values as the high-end. Finally, for datasets with only one data point, EPA presented the single exposure value. For datasets including exposure data that were reported as below the limit of detection (LOD), EPA estimated the exposure concentrations for these data following EPA's *Guidelines for Statistical Analysis of Occupational Exposure Data* (U.S. EPA, 1994), which recommends using the $\frac{LOD}{\sqrt{2}}$ if the geometric standard deviation of the data is less than 3.0 and $\frac{LOD}{2}$ if the geometric standard deviation is 3.0 or greater. When all datapoints in a dataset were non-detects, EPA used half the maximum LOD and the maximum LOD as the central tendency and high-end respectively. See Sections 8.1.3 (for general methodology) and 8.2 (for OES-specific methodology) of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

EPA used the estimated central tendency and high-end full-shift time-weighted average (TWA) inhalation exposure concentrations to calculate exposure metrics required for risk evaluation. Table 4-1 summarizes the TWA inhalation and dermal (summarized in Section 4.1.1.2) exposure results to workers and ONUs for each OES. The occupational exposure assessment has shown that inhalation exposures are expected to be higher during the Repackaging, Processing OESs (Processing as a Reactant; Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing; Incorporation into Formulation, Mixture, or Reaction Product); Use of Paints and Coatings; Use of Cleaning and Furnishing Care Products; and Use of Other Cleaning Products.

Table 4-1. Summary of Occupational Inhalation and Dermal Exposure for *o*-Dichlorobenzene by OES

Occupational Exposure Scenario (OES)	Worker Description	Exposure Days (day/yr)	Worker Inhalation Time-Weighted Average (TWA) Exposure, ppm		Acute Dermal Potential Dose Rate (APDR), mg/day		Sources for Inhalation Data (for Dermal, see Section 4.1.1.2) [d]
			CT	HE	CT	HE	
Manufacturing	Various	Various	*p*-Dichlorobenzene monitoring data used as a surrogate. All *p*-dichlorobenzene samples were not detected above the LOD. Byproduct is ≥50% *p*-dichlorobenzene (with lesser *o*-dichlorobenzene and some *m*-dichlorobenzene). Occupational exposure not quantitatively assessed. [a]				Surrogate (Exponent Inc., 2024)
Repackaging	Worker - Polymer Chemical Operators	250	1.0E−02	0.12	26	64	Analogous (SABIC, 2024)
	Worker - Copolymer Chemical Operators	250	1.1E−02	0.10			
	ONU - Support Personnel (1 point, no CT/HE)	250	9.6E−03	9.6E−03	–	–	
Processing as a Reactant	Material Handlers	200	1.5E−02	0.32	26	64	*p*-dichlorobenzene (*p*-DCB) surrogate (Integral Consulting, 2024) and 1,1,2-TCA surrogate (Labcorp Early Development, 2023)
	Process Field Operators	200	2.1E−03	1.3E−02			
	Laboratory Technicians 12-hour (*p*-DCB surrogate)	200	3.0E−02	6.0E−02			
	Laboratory Technicians 8-hour (1,1,2-TCA surrogate)	250	5.5E−05	5.1E−03			
	Laboratory Technicians 12-hour (1,1,2-TCA surrogate)	167	1.3E−05	5.4E−04			
	ONU	200	1.6E−02	3.1E−02	–	–	
Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing	Average Adult Worker	250	0.14	0.56	26	64	Monitoring (OSHA, 2019)
	ONU	250	0.14	0.14	–	–	
Incorporation into Formulation, Mixture, or Reaction Product	Average Adult Worker	250	0.11	4.9	1.7	6.8	Monitoring (IARC, 1999; Dow Chemical, 1984)
	ONU	250	0.11	0.11	–	–	
Plastics Compounding	Various	Various	*p*-Dichlorobenzene monitoring as a surrogate. All *p*-dichlorobenzene samples were non-detects. Occupational exposure not quantitatively assessed. [c]				Surrogate (Integral Consulting, 2024)
Plastics Converting	Various	Various	*p*-Dichlorobenzene monitoring as a surrogate. All *p*-dichlorobenzene samples were non-detects. Occupational exposure not quantitatively assessed. [c]				Surrogate (Integral Consulting, 2024)

Occupational Exposure Scenario (OES)	Worker Description	Exposure Days (day/yr)	Worker Inhalation Time-Weighted Average (TWA) Exposure, ppm		Acute Dermal Potential Dose Rate (APDR), mg/day		Sources for Inhalation Data (for Dermal, see Section 4.1.1.2) [d]
			CT	HE	CT	HE	
Functional Fluids (Closed System)	Average Adult Worker	6–12	1.0E−02	0.13	20	51	Analogous (SABIC, 2024)
	ONU	6–12	1.0E−02	1.0E−02	–	–	
Industrial Use of Solvents	Worker - Polymer Chemical Operators	250	1.0E−02	0.11	27	68	Monitoring (SABIC, 2024)
	Worker - Copolymer Chemical Operators	250	1.1E−02	0.10			
	Worker - Maintenance Mechanics & Electricians	250	4.3E−03	5.5E−02			
	ONU - Support Personnel	250	7.6E−03	5.3E−02	–	–	
Use of Ink, Toner, and Colorant Products	Average Adult Worker	250	8.3E−03	3.7E−02	1.8	6.0	Monitoring (OSHA, 2019)
	ONU	250	8.3E−03	8.3E−03	–	–	
Use of Paints and Coatings	Average Adult Worker	250	0.11	3.7	2.2	8.7	Modeled (OECD, 2011a)
	ONU	250	0.11	0.11	1.3	3.4	
Use of Paint Thinners & Removers	Average Adult Worker	250	2.5E−03	5.0E−03	1.7	6.8	Monitoring (NIOSH, 1981)
	ONU	250	2.5E−03	2.5E−03	–	–	
Use of Lubricants and Greases	Average Adult Worker	253	6.5E−03	3.4E−02	0.22	0.87	Modeled (OECD, 2020)
	ONU	253	6.5E−03	6.5E−03	–	–	
Use of Fuels and Related Products	Average Adult Worker	250	3.2E−06	6.9E−05	3.6E−02	0.12	Modeled (U.S. EPA, 2021b)
	ONU	250	3.2E−06	3.2E−06	–	–	
Use in Solid Air Care Products	Average Adult Worker	250	See Table 4-2 [b]		See Table 4-2		Modeled IECCU Version 1.1 (U.S. EPA, 2019b)
	ONU						
Use of Laboratory Chemicals	Laboratory Technician (from *p*-DCB, 12-hour)	200	3.0E−02	6.0E−02	6.9	45.2	Surrogate from *p*-dichlorobenzene (p-DCB) (Integral Consulting, 2024) and 1,1,2-TCA (Labcorp Early Development, 2023)
	Laboratory Technician (from 1,1,2-TCA, 8-hour)	167	5.5E−05	5.1E−03			
	Laboratory Technician (from 1,1,2-TCA, 12-hour)	250	1.3E−05	5.4E−04			
	ONU (from *p*-dichlorobenzene, 12-h)	200	3.0E−02	3.0E−02	–	–	
	ONU (from 1,1,2-TCA 8-hour)	167	5.5E−05	5.5E−05			
	ONU (from 1,1,2-TCA 1-h)	250	1.3E−05	1.3E−05			
Use of Cleaning and Furnishing Care Products	Average Adult Worker	250	0.15	0.15	26	64	Monitoring (OSHA, 2019)

Occupational Exposure Scenario (OES)	Worker Description	Exposure Days (day/yr)	Worker Inhalation Time-Weighted Average (TWA) Exposure, ppm		Acute Dermal Potential Dose Rate (APDR), mg/day		Sources for Inhalation Data (for Dermal, see Section 4.1.1.2)[d]
			CT	HE	CT	HE	
Sheep Branding Fluid	Average Adult Worker	250	See Table 4-2		2.5	7.5	Modeled CEM Version 3.2 (U.S. EPA, 2023a)
Use of Other Cleaning Products	Average Adult Worker	250	See Table 4-2		2	59	Modeled CEM Version 3.2 (U.S. EPA, 2023a)
Disposal	Average Adult Worker	167	1.1E−02	2.3E−02	0.70	1.8	Surrogate (Exponent Inc., 2024)
	ONU	250	1.7E−02	3.2E−02	–	–	

1,1,2-TCA = 1,1,2-trichloroethane; CEM = Consumer Exposure Model; CT = central tendency; HE = high-end; IECCU = Indoor Environmental Concentrations in Buildings with Conditioned and Unconditioned Zones (Model); OES = occupational exposure scenari; ONU = occupational non-user;
Where EPA was not able to estimate ONU inhalation exposure from monitoring data or models, this was assumed equivalent to the central tendency experienced by workers for the corresponding OES; liquid dermal exposure for ONUs was not evaluated because they are not expected to be in direct contact with liquid *o*-dichlorobenzene
[a] This OES assessed exposure to *o*-dichlorobenzene when it is manufactured as a byproduct during the vinyl chloride monomer (VCM) Per-Tri production process. There is insufficient information available for quantifying air concentrations and dermal exposure estimates for *o*-dichlorobenzene due to the low levels of the chemical in the process. Monitoring data was available for *o*-dichlorobenzene's isomer, *p*-dichlorobenzene, which is manufactured in the same process at higher amounts. These *p*-dichlorobenzene monitoring data were entirely non-detects (with limits of detection (LODs) in the 20–40 ppb range), and no unreasonable risk was found when *p*-dichlorobenzene levels were conservatively assumed to be at the monitoring method's limit of detection (LOD). Because exposures to *o*-dichlorobenzene must be lower than they would be for *p*-dichlorobenzene, EPA has determined that exposures for this OES are negligible. See Section 8.2.1 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for more details.
[b] See Section 8.2.15 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for the inhalation exposure assessment.
[c] Although *o*-dichlorobenzene air and dermal data are insufficient for quantification, exposures are expected to be lower than for p-dichlorobenzene, for which all measurements were below the LOD. EPA therefore considers *o*-dichlorobenzene exposures from plastic compounding and converting negligible and human-health risks unlikely.
[d] "Analogous data" refers to data from the same chemical and similar (but not the same) OES. "Surrogate data" refers to data from a different chemical and the same or similar OES.

Table 4-2 presents inhalation exposures for commercial Use in Solid Air Care Products that was included into the risk evaluation separately because this scenario was modeled using IECCU and for unique exposure scenarios. This model's output is a 24-hour TWA, but it is calculated with the assumption that the worker is exposed for 8 hours of that day. An airport was used to model a reasonable exposure scenario for commercial use, assuming that air care products are replaced once per month, consistent with product recommendations. Details of this assessment are available in Section 8.2.15.3 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

For Sheep Branding Fluid OES, air concentrations were calculated with CEM, with the 8-hour TWA of 4.5×10^{-3} mg/m^3. The 24-hour TWA is 2.0×10^{-1} mg/m^3. The chronic average daily concentration (ADC) is 1.7×10^{-3} mg/m^3. EPA used 95th percentile inputs for duration of use for acute and 50th percentile for chronic to calculate the concentrations.

For septic tank cleaners, EPA used CEM by adjusting inputs specific for a worker scenario. For mass of product used, the Agency identified a manuscript describing *o*-dichlorobenzene fate and transport in a domestic septic system that used a commercially available plumbing line cleaner/deodorizer, SAN-O-

VAN, containing *o*-, *m*-, and *p*-dichlorobenzene at a ratio of 74:11:15, respectively (Robertson, 1994). In the study, SAN-O-VAN was injected into the household plumbing at the recommended cleansing dose of 450 mL. To convert to g, the 450 mL was multiplied by the density of *o*-dichlorobenzene of 1.30 g/cm^3, which equates to 585 g. EPA acknowledges that the percent of *o*-dichlorobenzene used in this cleaner is 75%, compared to the identified SDS in the risk evaluation at 99% (Utility Wonder Products, 2014). However, the Agency considers mass used to be consistent throughout all of these products. Therefore, EPA used 582 g of the cleaner as the mass and used 0.99 weight fraction in CEM modeling. The Agency has robust overall confidence for modeling this COU inhalation exposure, given the reported weight fraction and amount of use. The weight fraction was reported though the SDS and amount used based on reported directions. Although there is uncertainty in the duration of use as there were no values identified in the *Exposure Factors Handbook* (also called the "EFH") (U.S. EPA, 2011a) for this product, the Agency has confidence that the user does not take long to flush the product down the toilet after pouring.

EPA did not identify duration of use for toilet or drain cleaners from the EFH (U.S. EPA, 2011a). For both acute and chronic duration, the Agency used a professional judgement of 5 minutes of use. The Agency assumes that the worker will pour the product into a toilet, flush, and the task does not take a significant amount of time. For frequency of use, EPA used an assumption that a worker could use the product 8 times a day for acute exposure, using the product at 8 different homes during a work shift. For chronic exposure, the Agency assumed 250 workdays, equal to 2,000 applications per year. EPA also conducted a bounding estimate based on commercial assumptions, where a worker may only use the product once a day, instead of 8 times, with all other inputs constant. In Table 4-2, one use per day is labeled as low-end while 8 uses per day is labeled as high-end.

The scenario used to model *o*-dichlorobenzene exposure from the use of septic tank cleaners was a bathroom with a room volume of 15 m^3 was based on CEM defaults.

Table 4-2. Inhalation Acute and Chronic Exposure Concentrations for Commercial Uses of Solid Air Care Products in Airports, Sheep Branding Fluid, and Use of Other Cleaning Products

OES	Acute			Chronic		
	Exposure Metric	Exposure Concentration		Exposure Metric	Exposure Concentration	
		mg/m^3	ppm		mg/m^3	ppm
Solid Air Care Products (Low Exposure Intensity) [a]	Maximum 24-hour TWA	9.7E−03	1.6E−03	30-day TWA	2.4E−03	3.9E−04
Solid Air Care Products (High Exposure Intensity) [a]		1.1E−02	1.8E−03		2.6E−03	4.3E−04
Sheep Branding Fluid	24-hour TWA	1.7E−03	3.3E−02	Chronic ADC	5.2E−02	8.7E−02
Use of Other Cleaning Products (Low-End)	24-hour TWA	29	4.8	Chronic ADC	20	3.3
Use of Other Cleaning Products (High-End)	24-hour TWA	233	398	Chronic ADC	160	27

ADC = average daily concentration
[a] Time-weighted averages (TWAs) are based on 8-hour shifts. Additionally, the low 8-hour TWA is 2.9E−02 mg/m^3 and high is 3.1E−02 mg/m^3. Emission calculation assumes an exponentially-decaying rate, starting from an initial emission rate of 500 mg/hour.
Low exposure intensity = Mid-size airport, 10 toilets for a 235 m^3 bathroom in a 18,997 m^3 terminal
High exposure intensity = Large airport, 20 toilets for a 336 m^3 bathroom in a 31,043 m^3 terminal

4.1.1.2 Summary of Dermal Exposure Assessment

Because dermal monitoring data were not available, EPA modeled worker skin exposure to liquid and solid *o*-dichlorobenzene in 17 OESs using a fractional absorption approach. The model estimates the potential daily dermal dose from a single contact per workday, based on assumed skin loading and *o*-dichlorobenzene's steady-state fractional absorption; exposure concentrations reflect current products and formulations. Because reliable fractional absorption data for *o*-dichlorobenzene was not found, EPA used fractional absorption data as surrogate data fom *p*-dichlorobenzene that was obtained empirically via a test order (Charles River Laboratories, 2025). Assuming once daily contact, EPA used 0.04 (4%) dermal absorption when the substance contains more than 50% *o*-dichlorobenzene by weight and 0.02 (2%); otherwise, aligning with the results of the test order data demonstrating up to 4% absorption for neat *p*-dichlorobenzene and up to 2% absorption when in solution at a weight fraction of 50% or less. To capture variability in inputs such as dermal loading (0.7–2.1 mg/cm^2 per event is assumed (U.S. EPA, 2013)) and exposed skin area (0–1,070 cm^2 is assumed), EPA ran 100,000-iteration Monte Carlo simulations with Latin Hypercube sampling. The dermal approach is explained in more detail in Section 8.1.4 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

Dermal exposures to *o*-dichlorobenzene are highest during Repackaging, Processing OESs (Processing as a Reactant; Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing; and Incorporation into Formulation, Mixture, or Reaction Product), Use of Cleaning and Furnishing Care Products, and Use of Other Cleaning Products.

Table 4-1 summarizes the central tendency and high-end occupational dermal exposure results to workers and ONUs for each OES. For each OES, EPA attempted to provide central tendency and high-end acute potential dermal dose rates (APDR). Workers who handle *o*-dichlorobenzene may have dermal exposure. For ONUs, EPA did not assess dermal exposure to most liquid *o*-dichlorobenzene uses because they are not expected to handle the liquid. However, the Agency addressed dermal exposures to ONUs from solids and mist as ONUs may encounter dust or mist that settles on surfaces.

Table 4-3 presents the results for Commercial Use of Solid Air Care Products, which were modeled using flux-based absorption and incorporated unique exposure scenarios and populations compared to other occupational COUs (*i.e.,* a janitor cleaning airport bathrooms). The table summarizes the highest exposure intensity across the three parameters of surface area, duration of exposure, and number of products handled. EPA did not find risk from this highest exposure scenario. See *Draft Commercial Inhalation and Dermal Exposure Risk Calculator for o-Dichlorobenzene* (U.S. EPA, 2026h) for the full analysis.

Table 4-3. Dermal Exposure Results for Commercial Use of Solid Air Care Products

Exposure Level	Surface Area	Urinal Cakes Placed per Month	Time Holding Urinal Cake	Acute Exposure Dose (mg/kg/day)	Intermediate/Chronic Exposure Dose (mg/kg/day)
Highest	Inside both hands	100	5 minutes	2.91E−01	9.55E−03

4.1.1.3 Weight of Scientific Evidence Conclusions for Occupational Exposure

EPA estimated occupational exposure from multiple inhalation monitoring sources, relying primarily on inhalation data submitted by SABIC, Westlake Corporation, and the American Chemistry Council under test orders for *o*- and *p*-dichlorobenzene (Exponent Inc., 2024; Integral Consulting, 2024; SABIC, 2024). These datasets were rated high quality in EPA's systematic review; other studies were high or medium quality, with additional worker exposure data from OSHA Chemical Exposure Health Data (CEHD) (medium) and the literature (medium-to-high).

EPA's estimate of workers potentially exposed to *o*-dichlorobenzene has uncertainty, but errors are unlikely to consistently under- or overestimate totals. Assigning industries and occupations to uses is inherently subjective and may inadvertently include low-exposure groups or omit exposed ones, creating inaccuracy without systematic bias. Except for manufacturing, OES-specific site counts were unavailable; EPA therefore used North American Industry Classification System (NAICS)-based bounding estimates that likely overstate the number of sites for those OESs. Table 4-4 summarizes the potential number of sites and exposed workers per site estimates for each OES based on the methodology described in the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

Table 4-4. Estimated Average Number of Workers per Site Potentially Exposed to *o*-Dichlorobenzene During Each OES

OES	Exposure Days Per Year	Potential No. of Sites	Potentially Exposed Workers per Site	Potentially Exposed ONUs per Site
Manufacturing	Various	14	510	196
Repackaging	250	21,140	3	2
Processing as a Reactant	200	10	6,980	4,029
Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing	250	12,398	5	2
Incorporation into Formulation, Mixture, and Reaction Product	250	2,915	14	7
Plastics Compounding	200	1,527	20	13
Plastics Converting	167	11,194	47	7
Use of Functional Fluids	6–12	841	71	18
Industrial Use of Solvents	250	30	14	7
Use of Ink, Toner, and Colorant Products	250	23,585	6	1
Use of Paints and Coatings	250	54,075	4	1
Use of Paint Thinner and Removers	250	1,760	103	62
Use of Lubricants and Greases	253	112,387	10	3
Use of Fuels and Related Products	250	126,879	1	5
Use in Solid Air Care Products	250	60,280	1	1
Use of Laboratory Chemicals	250	10,490	3	7
Use of Cleaning and Furnishing Care Products	250	28,144	4	1
Use of Sheep Branding Fluid	250	4,758	1	1
Use of Other Cleaning Products	250	3,545	3	1
Disposal	167 (250 [a])	35	2	5
OES = occupational exposure scenario; ONU = occupational non-user				

OES	Exposure Days Per Year	Potential No. of Sites	Potentially Exposed Workers per Site	Potentially Exposed ONUs per Site

[a] 250 days/yr for ONUs. Please note that for all OESs but Disposal, exposure days/yr values are equal for workers and ONUs.

For some OESs, EPA estimated inhalation exposure using *o*-dichlorobenzene test order personal monitoring data, which are directly applicable and include substantial samples for workers and ONUs. Key limitations include assuming 167 or 250 exposure days per year based on shift length and reported schedules, uncertainty in representativeness when data are sparse, and variability across sites in work practices and engineering controls. For some OESs, EPA used *p*-dichlorobenzene test order data as a surrogate for *o*-dichlorobenzene. This adds uncertainty because adjustments for differences in concentration, use conditions, and physicochemical properties (*e.g.,* volatility, partitioning) may not fully represent *o*-dichlorobenzene exposures, and surrogate sites/tasks may differ from those in the target OES. For three OESs (*e.g.,* Use of Cleaning and Furnishing Care Products), EPA used OSHA CEHD inhalation data for the "Average Adult Worker.: Because these data lack SEG/role descriptors and have no ONU-specific measurements, EPA used the worker central tendency (CT) exposure as a proxy to estimate ONU inhalation exposure.

EPA estimated dermal exposures using modeling approaches supported by a moderate evidence base. The main limitation is uncertainty in how well the input values represent the true distribution of dermal exposures. Also, EPA relied on surrogate *p*-dichlorobenzene fraction-absorbed values from test order data (Charles River Laboratories, 2025). Accordingly, the overall weight of scientific evidence for these modeling methods across all OESs is moderate.

In Table 4-5, EPA summarizes the weight of scientific evidence ratings for the occupational exposures for each OES. The Agency has the highest confidence (robust) in seven OESs, which had large datasets of directly applicable monitoring data. Also, six OESs received a robust confidence rating, which used information from analogous or surrogate sources to estimate worker exposure. The high/medium (moderate) confidence is for Incorporation into Formulation, Mixture or Reaction Product OES. For more detail, see the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

Table 4-5. Summary of the Weight of Scientific Evidence Ratings for *o*-Dichlorobenzene Occupational Exposures

Occupational Exposure Scenario (OES)	Inhalation Exposure									Dermal Exposure		
	o-Dichlorobenzene Data[a]						Modeling		WOSE Conclusion	Modeling		WOSE Conclusion
	Worker	# Samples[b] (# Below Detection); LOD Range (ppm)	ONU	# Samples (# Below Detection); LOD Range (ppm)	Data Quality Ratings	Monitoring, Analogous, or Surrogate Data[a]	Worker	ONU		Worker	ONU	
Manufacturing	Not quantitatively assessed, see Table 4-1				High	Surrogate	N/A	N/A	Moderate	See Table 4-1		Moderate
Repackaging	✓	14 (1); 3.0E−03	✓	1 (0)	High	Analogous	N/A	N/A	Robust	✓	NQ	Moderate
Processing as Reactant	✓	40 (33); 4.1E−03 to 5.7E−02	✓	22 (22); 4.1E−03 to 3.0E−02	High	Surrogate	N/A	N/A	Moderate	✓	NQ	Moderate
Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing	✓	5 (0)	CT-AAW[c]	N/A	High	Monitoring	N/A	N/A	Moderate	✓	NQ	Moderate
Incorporation into Formulation, Mixture or Reaction Product	✓	12 (3); 5.0E−02	CT-AAW	N/A	High/ Medium	Monitoring	N/A	N/A	Slight-to-Moderate	✓	NQ	Moderate
Plastics Compounding	Not quantitatively assessed, see Table 4-1				High	Surrogate	N/A	N/A	Slight-to-Moderate	See Table 4-1		Moderate
Plastics Converting	Not quantitatively assessed, see Table 4-1				High	Surrogate	N/A	N/A	Slight-to-Moderate	See Table 4-1		Moderate
Functional Fluids (Closed System)	✓	15 (1); 3.0E−03	CT-AAW	N/A	High	Analogous	N/A	N/A	Moderate-to-Robust	✓	NQ	Moderate
Industrial Use of Solvents	✓	22 (3); 3.0E−03 to 4.0E−03	✓	6 (1); 3.0E−03	High	Monitoring	N/A	N/A	Robust	✓	NQ	Moderate
Use of Ink, Toner, and Colorant Products	✓	23 (22); 1.1E−02 to 4.4E−02	CT-AAW	N/A	High	Monitoring	N/A	N/A	Moderate	✓	NQ	Moderate

Occupational Exposure Scenario (OES)	Inhalation Exposure									Dermal Exposure		
	o-Dichlorobenzene Data[a]						Modeling		WOSE Conclusion	Modeling		WOSE Conclusion
	Worker	# Samples[b] (# Below Detection); LOD Range (ppm)	ONU	# Samples (# Below Detection); LOD Range (ppm)	Data Quality Ratings	Monitoring, Analogous, or Surrogate Data[a]	Worker	ONU		Worker	ONU	
Use of Paints and Coatings	N/A	N/A	N/A	N/A	N/A	N/A	✓	CT-AAW	Moderate	✓	✓	Moderate
Use of Paint Thinners and Removers	✓	1 (1); 4.99E−03	CT-AAW	N/A	High	Monitoring	N/A	N/A	Slight-to-Moderate	✓	NQ	Moderate
Use of Lubricants and Greases	N/A	N/A	N/A	N/A	N/A	N/A	✓	CT-AAW	Moderate	✓	NQ	Moderate
Use of Fuels and Related Products	N/A	N/A	N/A	N/A	N/A	N/A	✓	CT-AAW	Moderate	✓	NQ	Moderate
Use in Solid Air Care Products	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	Moderate	✓	✓	Moderate
Use of Laboratory Chemicals	✓	29 (10); 7.6E−06 to 1.2E−05	CT-AAW	N/A	High	Surrogate	N/A	N/A	Moderate	✓	NQ	Moderate
Use of Cleaning and Furnishing Care Products	✓	1 (0)	NE	N/A	High	Monitoring	N/A	N/A	Moderate	✓	NQ	Moderate
Use of Sheep Branding Fluid	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	Moderate	✓	NQ	Moderate
Use of Other Cleaning Products	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	Moderate	✓	NQ	Moderate
Disposal	✓	13 (13); 2.2E−02 to 2.2E−02	✓	6 (6); 2.6E−02 to 3.3E−02	High	Surrogate	N/A	N/A	Slight-to-Moderate	✓	NQ	Moderate

✓indicates EPA performed occupational exposure assessment for this occupational exposure scenario (OES) and its corresponding worker and occupational non-user
NE = EPA did not generate estimates of ONU exposure; however, EPA assumes that ONU exposures would be equal to or less than estimated worker exposures.

Occupational Exposure Scenario (OES)	Inhalation Exposure									Dermal Exposure		
	o-Dichlorobenzene Data[a]						Modeling		WOSE Conclusion	Modeling		WOSE Conclusion
	Worker	# Samples[b] (# Below Detection); LOD Range (ppm)	ONU	# Samples (# Below Detection); LOD Range (ppm)	Data Quality Ratings	Monitoring, Analogous, or Surrogate Data[a]	Worker	ONU		Worker	ONU	

NQ = Dermal exposures for ONUs for *o*-dichlorobenzene are expected to be negligible because they do not directly handle the chemical and this OES does not generate airborne mists.
WOSE = weight of scientific evidence
[a] "Monitoring data" refers to data from the same chemical and corresponding OES. "Analogous data" refers to data from the same chemical and similar (but not the same) OES. "Surrogate data" refers to data from a different chemical and the same or similar OES.
[b] Only full-shift samples included in data point counts.
[c] CT-AAW: In absence of data specific to ONU exposure, EPA assumed that central tendency of average adult worker (CT-AAW) exposure was representative of ONU exposure and used to generate estimates for ONUs.

4.1.2 Consumer Exposures

EPA evaluated consumer exposures to Paints and coatings, Lubricants/greases, Fuels and related products, Air care products and Other uses (Table 1-1). Although there are five COUs, the Marvel Mystery Oil falls under both Lubricants/greases and Fuels and related products and therefore was only evaluated under the Lubricants/greases COU. The major routes of exposure considered were inhalation and dermal exposure. Air care product air concentrations were modeled using the Indoor Environmental Concentrations in Buildings with Conditioned and Unconditioned Zones (IECCU). Lubricants/greases, paint thinners, glazes, sheep branding product, and septic tank cleaner air concentrations were modeled using CEM.

For each of the consumer COUs (Table 1-1), EPA evaluated the exposure to consumers using CEM or IECCU to calculate the 24-hour TWA and 1-year chronic average daily concentrations for inhalation and dermal exposures during relevant product use.

For this assessment, EPA used representative inputs and assumptions for modeling (U.S. EPA, 2026f). This includes 95th percentile duration and frequency of use for acute scenarios and 50th percentile for chronic scenarios. For acute exposure, the Agency used values to represent representative high-end tendency of use. For chronic exposures, EPA used values more representative of central tendency, as consumers are not anticipated to use products at their maximum frequency and duration, long-term. Certain inputs to which model outputs are sensitive, such as zone volumes and airflow rates, were not varied across product-use scenarios. As a result, model outcomes for extreme circumstances such as a relatively large chemical mass in a relatively low-volume environment are likely not represented among the model outcomes. Such extreme outcomes are believed to lie near the upper end (*e.g.*, ≥95th percentile) of the exposure distribution. EPA calculated inhalation risk estimates based on ambient air concentrations and did not derive lifestage-specific internal doses because the inhalation hazard value is an air concentration rather than a dose and is not dependent on body weight or specific to any particular lifestage.

4.1.2.1 Summary of Consumer Inhalation Exposure Assessment

EPA used IECCU to model inhalation air care products for exposure to *o*-dichlorobenzene, which focuses on exposures when a consumer uses the product at home. The Agency identified one active toilet bowl deodorizer SDS with a weight fraction of 0.01. As a more refined model, IECCU Version 1.1 (U.S. EPA, 2019b) was selected to model consumer inhalation exposures to *o*-dichlorobenzene for the use of the toilet bowl deodorizer products using the single exponential decay model. In this decay model, the emissions are modeled at an initial rate specified by the user followed by a decay in emission rate as the chemical concentration in the product declines. The calculated emission rates are then used in a deterministic, mass balance calculation to determine indoor air concentrations. IECCU can be configured with one, two, or up to three zones within a building. As a starting point, EPA used two bathrooms for modeling. To match the conditions used in CEM for products, the toilet bowl deodorizer was modeled in IECCU using a three-zone configuration, where Zones 1 and 3 are the bathrooms (with one toilet bowl deodorizer in each) and Zone 2 represents the rest of the house. Ventilation rates were calculated using 0.45 air changes per hour, and the bathroom (30 m^3) and home volumes (492 m^3) were used from the EFH (U.S. EPA, 2011b). Further information on the rationale for using IECCU instead of CEM is available in Section 7.1.4.3 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

EPA used (Guerrero and Corsi, 2012) to determine the emission profile to use in the IECCU air modeling. Although the authors did not mention the specific product used in their experiment, they mentioned that the toilet bowl deodorizer product was purchased from "the largest manufacturer of such products in the United States"; the product contained 0.99 weight fraction of *p*-dichlorobenzene, and EPA is assuming that the product is 0.01 weight fraction *o*-dichlorobenzene. Therefore, the Agency judged that the product was a suitable match to the COU being modeled here. The authors placed the product in an enclosed chamber at a height that simulated a toilet bowl and measured the subsequent emission rate every 3 to 7 days for a month in a set of 3 independent trials. In the study, the experiment started measuring emission rates at around 34 hours. For *p*-dichlorobenzene, EPA used 500 mg/hour as the initial emission rate at time 0, therefore, based on the weight fraction is approximately 0.01 for *o*-dichlorobenzene (≈0.01 of *p*-dichlorobenzene weight fraction) and both have similar chemical properties, EPA used 5 mg/h for the emission rate.

For the chronic scenario, EPA assumed replacement of the deodorizers monthly based on product packaging guidance, and therefore the user would replace the deodorizer each month in both bathrooms. Therefore, from the EFH (U.S. EPA, 2011b), the Agency calculated the 50th percentile time spent in the bathroom (12.5 hours/month) and 492.5 hours/month spent inside the residence. This equates to 480 hours/month spent in the rest of the house, and not in the bathroom or outside of home. For more details on IECCU modeling approach and parameters, see Section 7.3.4 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA considers these activity patterns to be representative of consumer behavior in the United States. The ventilation rates are standard within EFH, and the time spent in the bathroom is sourced from the EFH. The 95th percentile activity pattern was used for the acute scenario, and the 50th percentile activity pattern was used for the chronic exposure calculation. For septic tank cleaners, EPA did not identify duration of use through product information or EFH and assumed a 5-minute use for both acute and chronic scenarios.

For lubricants/greases, paint thinners, ceramic glazes, and septic tank cleaner products for consumers, EPA used CEM. As the Agency used representative assumptions to characterize scenarios to be health protective, additional refinement was not necessary. For this assessment, modeled air concentrations are based on highest identified weight fractions, and 95th percentile frequency and duration of uses are based on EFH numbers (U.S. EPA, 2011b). Based on product directions, the automotive lubricant/degreaser is used when filling gas. EPA assumed a consumer fill their gas once a week. The Agency acknowledges that consumers could use the tool multiple times before needing to lubricate it and assumed that they would need to use the tool lubricant once a month. For septic tank cleaners, EPA did not identify specific product directions and assumed that a consumer could use the product once a year. For the acute scenario, the Agency used the same inputs as for workers of one time a day (see Section 4.1.1). For more details on CEM modeling approach and parameters, see Section 7.3.2 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

The modeled acute 24-hour average air concentrations across all products ranged from 6.4×10^{-4} to 35 mg/m^3, with the highest concentration from septic tank cleaners (See Section 7.5.1 in the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA acknowledges that automotive and tool lubricants/degreasers are considered intermittent exposures, where the product use could be periodic and have a different exposure pattern than chronic daily exposure.

Table 4-6. Consumer Acute 24-Hour Inhalation Concentrations of *o*-Dichlorobenzene in Consumer Products

Product	Acute 24-Hour Average Concentration (mg/m^3)	Chronic ADC (mg/m^3)
Air care products in 2 bathrooms	3.9E−02 [a]	8.9E−03 [a]
Automotive lubricant/degreaser	1.5E−03	2.2E−04
Tool lubricant/degreaser	7.3E−04	1.5E−05
Sheep branding fluid	1.7E−03	1.1E−04
Paint thinner (test order emission rate)	2.1E−02 [b]	2.1E−04
Paint thinner (default emission rate)	3.5E−02 [c]	9.7E−03
Ceramic glaze (test order emission rate)	2.4E−03 [b]	6.5E−06
Ceramic glaze (default emission rate)	6.4E−04 [c]	1.9E−04
Septic tank cleaner	35	8.0E−02

[a] Modeled using the Indoor Environmental Concentrations in Buildings with Conditioned and Unconditioned Zones (IECCU).
[b] Emission rate provided in response to test order issued by EPA.
[c] Default emission rates used from the Consumer Exposure Model (CEM).
Acute 24-hour concentration is different from duration of use. 24-hour concentration averages the concentration exposed by 24 hours while duration of use is the time a consumer uses the product. Durations are listed below:

- Automotive lubricant/degreaser and tool lubricant/degreaser: 10 min/day (acute), 5 min/day (chronic)
- Paint thinner, sheep branding fluid, glaze: 180 min/day (acute), 10 min/day (chronic)
- Septic tank cleaner: 5 min/day (acute and chronic)
- Toilet bowl deodorizer: 1.5 hours/day (acute), 0.4 hours/day (chronic)

4.1.2.2 Summary of Consumer Dermal Exposure Assessment

Dermal doses were calculated using formulas derived from (Frasch and Bunge, 2015), (ten Berge, 2009), and *Dermal Exposure Assessment: A Summary of EPA Approaches* (U.S. EPA, 2007) using the permeability and fractional absorption methods (Table 4-7). For acute and chronic fractional absorption methods, 2% and 4% fractional absorption was used. EPA estimated the absorption based on test order data for neat *p*-dichlorobenzene from (Charles River Laboratories, 2025). This study reported 0.93 to 2.24% absorption for *p*-dichlorobenzene concentrations of 50% or less in organic solvents. EPA applied the same logic for *o*-dichlorobenzene. Liquid consumer products contain less than 50% of *o*-dichlorobenzene, therefore the 2% absorption from the neat chemical is applied to these exposures—excluding the septic tank cleaner that is above 50%, so 4% was used. For more information on dermal modeling approaches and parameters, see Section 7.4 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). The acute dose rate ranged from 8.9×10^{-9} to 6.2×10^{-3} mg/kg/day. The chronic average daily dose ranged from 5.8×10^{-10} to 1.9×10^{-4} mg/kg/day.

EPA used the flux-based permeability dermal model for consumer solid air freshener (toilet bowl deodorizer) (U.S. EPA, 2007). The flux-based method was identified as the most appropriate for this scenario as it considers a nondepletable source of *o*-dichlorobenzene with little to no evaporation of the chemical in the area contacting the skin over the duration of the exposure. For this scenario, 1% concentration was used. The consumer is assumed to being in contact with two toilet bowl deodorizers (1 for each bathroom) for acute and 24 for chronic (2 deodorizers a month) for 5 minutes each. The scenario assumes that the consumer may use two hands (including the palms) to install the product.

EPA used the fractional absorption dermal model for all other products (U.S. EPA, 2026f). The fractional absorption method was identified as the most appropriate for these products as it calculates finite splash-type exposure, where there is instantaneous deposition onto the skin without deliberate contact with the product, such as pouring of lubricants and greases. Similar to inhalation, chronic exposure to the automotive lubricant is 52 times a year, 12 times a year for the air tool and septic tank cleaner, 23 times a year for paint thinner and glazes, and 6 times a year for sheep branding fluid.

Table 4-7. Consumer Acute and Chronic Dermal Dose Rates (Fractional Absorption)

Product Type	Age Group (years)	Acute Dose Rate (mg/kg/d)	Intermediate Dose Rate (mg/kg/d)	Chronic Dose Rate (mg/kg/d)
Automotive lubricant/ degreaser	Adult (21+)	8.9E−09	N/A	1.3E−09
	Youth (16–20)	8.9E−09	N/A	1.3E−09
Tool lubricant/ degreaser	Adult (21+)	1.8E−08	N/A	5.8E−10
	Youth (16–20)	1.8E−08	N/A	5.8E−10
Paint thinner	Adult (21+)	7.9E−07	2.1E−07	1.2E−08
	Youth (16–20)	7.9E−07	2.1E−07	1.2E−08
	Youth (11–15)	8.5E−07	2.3E−07	1.3E−08
Ceramic glaze	Adult (21+)	8.5E−07	2.3E−07	1.3E−08
	Youth (11–15)	8.5E−07	2.3E−07	1.3E−08
	Youth (16–20)	9.2E−07	2.4E−07	1.4E−08
Sheep branding fluid	Adult (21+)	1.7E−05	N/A	2.8E−07
	Youth (16–20)	1.7E−05	N/A	2.8E−07
Septic tank cleaner	Adult (21+)	6.2E−03	N/A	1.7E−05
	Youth (16–20)	6.2E−03	N/A	1.7E−05

The skin permeability coefficient K_p, (with units of length per time such as cm/hour), is a concentration-dependent parameter that is derived from the steady-state flux of material through the skin. For short-term *o*-dichlorobenzene dermal exposure to these products, EPA used a K_p of 3.8×10^{-4} cm/h, derived from the measured flux rate of *p*-dichlorobenzene in solution over a 10-minute period (CPA, 2005). For more information on flux permeability approaches and parameters, see Section 7.4.2 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

Table 4-8. Consumer Toilet Bowl Deodorizer Acute and Chronic Dermal Dose Rates (Flux Permeability)

Product Type	Age Group (years)	Acute Dose Rate (mg/kg/d)	Chronic Dose Rate (mg/kg/d)
Toilet bowl deodorizer, 2 bathrooms	Adult (21+)	5.8E−03	1.9E−04
	Youth (16–20)	5.4E−03	1.8E−04

4.1.2.3 Weight of Scientific Evidence Conclusions for Consumer Exposure

EPA has robust confidence in the overall characterization of exposure for consumer exposure to products containing *o*-dichlorobenzene. This confidence is based on the Agency's representative and refined inputs and assumptions used in IECCU, as well as use of methodologies and models that previously underwent peer review and public comment. EPA has robust confidence in the weight fraction (0.01) because it was reported in the SDS. The 95th percentile for acute and 50th percentile for chronic of duration of time spent in the room the product was used are also representative as they are taken from the EFH (U.S. EPA, 2011b). The emission rate is representative of the product, as it was derived from a peer-reviewed study that measured *p*-dichlorobenzene emission rates from an experiment replicating a bathroom and scaled down based on weight fraction for *o*-dichlorobenzene use (Guerrero and Corsi, 2012). Although the exact product tested was not mentioned, the study states that the product was purchased from "the largest manufacturer of such products in the United States," therefore, EPA has confidence that the product in the study contained 0.01 weight fraction *o*-dichlorobenzene as the identified SDS contained this concentration. People who may be exposed via this COU are those who live in the residential building where hanging toilet bowl deodorizers containing *o*-dichlorobenzene are used. Chronic inhalation and dermal estimates would be applicable to individuals who replace the product every month for 2 bathrooms for a year.

Two products were assessed for the lubricants and greases COU (Marvel Mystery Oil and Marvel Air Tool). Maximum reported weight fractions were reported though the SDS. For these products, the chronic scenario would be applicable to individuals who use them year-round (52 times a year for the oil and 12 times a year for the air tool). Similar to air care products, these frequencies were taken from the EFH (95th percentile for acute and 50th percentile for chronic) (U.S. EPA, 2011b). Product and use inputs were used from manufacturer directions, EFH or CEM default values. EFH and CEM default parameters generally represent actual products on the market, relevant use patterns and location of use. Therefore, the overall confidence for modeling this COU inhalation exposure estimate is robust.

For the paint thinner and ceramic glaze EPA has uncertainty about the emission rates of the paint thinner and two of the glazes ("mother of pearl" and "white gold"). The test order reported concentrations above the linear range of the calibration curve. This introduces uncertainty in the test order experimental results as they may be underestimating or overestimating the actual concentration being emitted. EPA Method TO-17, the analytical method used in test order, mentions that if the compound exceeds the calibration range, then the original solution must be diluted and reanalyzed (Woolfenden and McClenny, 1999). However, there is no evidence in the report suggesting that the samples outside the calibration curve were diluted or other corrections made to improve the quality of the data. Due to the uncertainty of the test order data, EPA has presented both the air concentrations using the test order and CEM default emission rates for comparison. When comparing the concentrations, the concentration for the paint thinner is 0.014 higher for the default emission rate compared to the test order. For the glaze, the concentration for the test order emission rate is 1.8×10^{-3} higher than the default. This suggests that concentrations were the same magnitudes of each other. Because the test order emission rates still have uncertainty, EPA has overall moderate confidence in the paint thinner and glaze products.

For septic tank cleaners, weight fractions were reported though the SDS. For this product, the chronic scenario would be applicable to individuals who use them once a year. There is uncertainty in the duration of use as there were no values identified in the EFH (U.S. EPA, 2011b) for this product. There is robust confidence in the mass used, as it is based on specific product directions. In Robertson (1994), the water table at 2 m depth found up to 13 µg/L *o*-dichlorobenzene, which contributes to drinking water concentration from well water. In another study, the highest groundwater concentration was 95 µg/L with no drinking water risk at that concentration (Jang and Townsend, 2001). See Section 6.3 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* for more information on the calculation (U.S. EPA, 2026f). Therefore, there is no drinking water risk at 13 µg/L from septic tank cleaners. Although there is limited information for duration of use, EPA has robust overall confidence for modeling this COU inhalation exposure, given the reported weight fraction and amount of use. For drinking water modeling, EPA also has robust confidence given the calculated dose from higher concentrations in groundwater shows no risk.

4.1.3 General Population Exposures

4.1.3.1 Summary of General Population Exposure Scenarios

Figure 4-1 illustrates potential exposure pathways for the general population. For *o*-dichlorobenzene, EPA expects ambient air to be a potential exposure pathway. *o*-Dichlorobenzene is released from industrial facilities as uncontrolled fugitive releases such as process equipment leaks, process vents, building windows, building doors, and roof vents. It is also released from industrial facilities as stack releases, which may be either uncontrolled (*e.g.,* direct releases out a stack) or controlled with a pollution control device (*e.g.,* baghouse, scrubber, thermal oxidizer). Once released to ambient air, *o*-dichlorobenzene can move off-site into the surrounding areas where human populations may be exposed through inhalation. The ambient air exposure assessment focuses on exposures to a subset of the general population living near industrial facilities that reported releases of *o*-dichlorobenzene to the ambient air. See Section 6.2 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for more details.

In addition, due to direct releases to water, drinking water may be a potential exposure pathway for the general population, specifically subpopulations that use untreated surface or groundwater as a primary source for drinking water. Details for the drinking water exposure scenario for adults and infants are described in Section 6.3 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

General population exposure pathways through soil, swimming and fish ingestion are not expected because, as described in Section 2.2, *o*-dichlorobenzene in soil and surface water is expected to volatilize given its physical and chemical properties and has low potential to bioaccumulate in organisms based on measured BCF values. Therefore, these exposure pathways were not evaluated quantitatively.

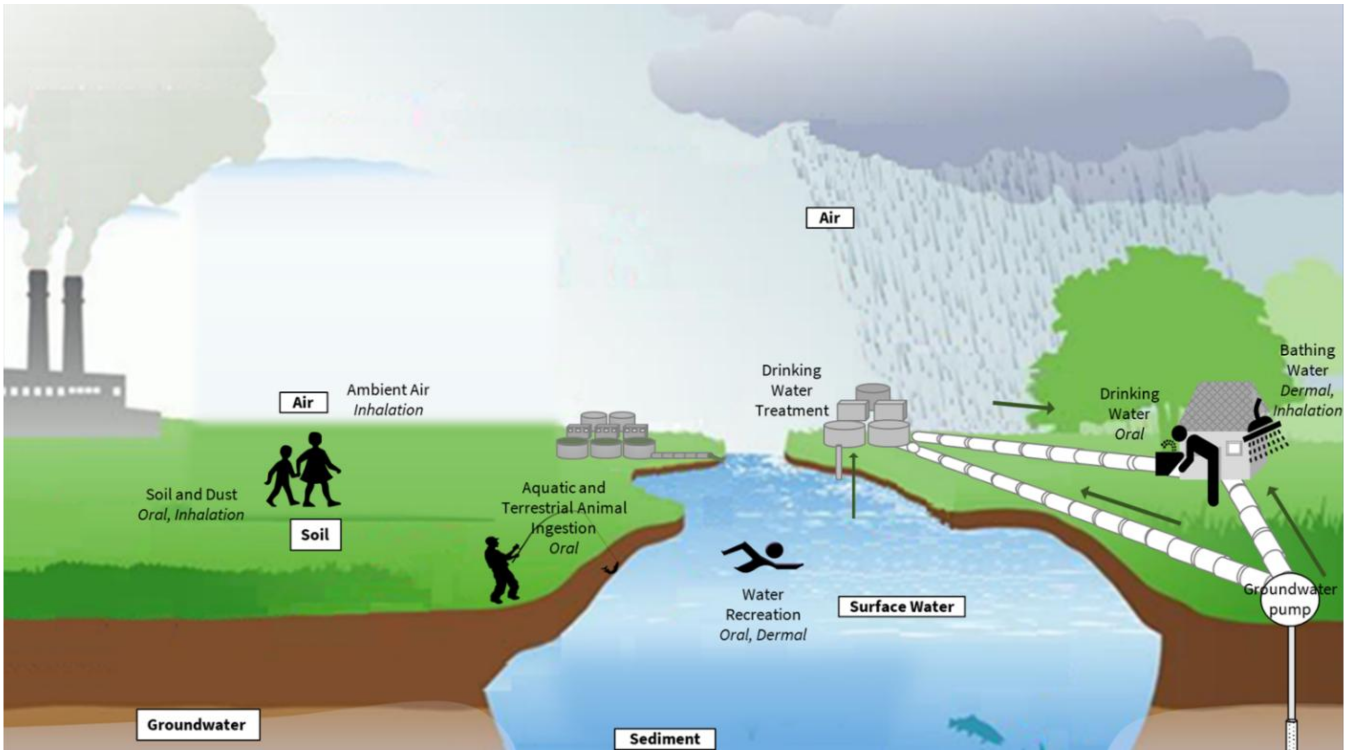

Figure 4-1. Potential Human Exposure Pathways to *o*-Dichlorobenzene for the General Population

4.1.3.2 Summary of Inhalation Exposure Assessment

EPA expects the ambient air pathway to be an exposure pathway to *o*-dichlorobenzene in the outdoor environment. In summary, *o*-dichlorobenzene is released from industrial facilities as uncontrolled fugitive releases such as process equipment leaks, process vents, building windows, building doors, and roof vents. It is also released from industrial facilities as stack releases, which may be either uncontrolled (*e.g.,* direct releases out a stack) or controlled with a pollution control device (*e.g.,* baghouse, scrubber, thermal oxidizer). Once released to ambient air, *o*-dichlorobenzene can move off-site into the surrounding areas where human populations may be exposed through inhalation. This inhalation exposure assessment focuses on exposures to a subset of the general population living near industrial facilities that are releasing *o*-dichlorobenzene to the ambient air. EPA did not model deposition for *o*-dichlorobenzene because, as described in Section 2.2, *o*-dichlorobenzene is not expected to associate strongly with airborne particulates or subsequently undergo deposition.

The Agency used the Integrated Indoor-Outdoor Air Calculator (IIOAC) to model ambient air concentrations based on facility releases from the TRI 2019 to 2023 database to assess general population exposure to air from facility releases of *o*-dichlorobenzene (U.S. EPA, 2025). For this assessment, IIOAC was used as a screening analysis to identify facilities/COUs that may raise exposure concerns and inform whether a higher-tier analysis and/or refined modeling is warranted to further characterize exposures of the general population to *o*-dichlorobenzene. For this assessment, modeled air concentrations are based on facility-specific releases and, therefore, general population and environmental exposures are associated with facility-specific assigned OESs and COUs. TRI facility releases were associated with the four OESs and associated COUs listed below in Table 4-9 (see Table 3-1 for the full list of OESs and associated COUs). Because there are no quantifiable facility releases tied to the other OESs and associated COUs, general population ambient air exposures to those OESs from facility releases are not expected to occur.

Table 4-9. Conditions of Use and Occupational Exposure Scenarios for General Population Exposures

Condition of Use (COU)			Occupational Exposure Scenario (OES)
Life Cycle Stage	**Category**	**Subcategory**	
Processing	Recycling	Recycling	Industrial Use of Solvents
Manufacturing	Manufacture	Domestic manufacture	Manufacturing
Manufacturing	Import	Import	Repackaging
Processing	Repackaging	Repackaging	
Disposal	Disposal	Disposal	Waste Handling, Treatment, and Disposal

Across all facilities, reporting years and modeled distances (100, 100–1,000 and 1,000 m), the mean (50th percentile) modeled concentrations ranged from 0.0 to 23.9 µg/m^3 and the 95th percentile ambient air modeled concentrations ranged from 0.0 to 26.2 µg/m^3 (Table 4-10), with the highest modeled concentration at 100 m. Highest modeled concentrations were associated with the OES: Industrial Use of Solvents. For full IIOAC modeling results, see the supplemental file: *Draft Integrated Indoor Outdoor Air Calculator (IIOAC) TRI 2019-2023 Exposure and Risk Analysis for o-Dichlorobenzene* (U.S. EPA, 2026x).

Table 4-10. IIOAC-Modeled Concentrations from TRI Facility Releases

COU			OES	Facility Count	Maximum 50th Percentile Modeled Concentration (µg/m³)			Maximum 95th Percentile Modeled Concentration (µg/m³)		
Life Cycle Stage	Category	Subcategory			Distance			Distance		
					100 m	100–1,000 m	1,000 m	100 m	100–1,000 m	1,000 m
Processing	Recycling	Recycling	Industrial Use of Solvents	4	24	2.8	1.1	26	3.2	1.3
Manufacturing	Manufacture	Domestic manufacture	Manufacturing	2	5.0E−02	1.0E−02	1.0E−02	6.0E−02	1.0E−02	1.0E−02
Manufacturing	Import	Import	Repackaging[5]	1	0.0	0.0	0.0	0.0	0.0	0.0
Processing	Repackaging	Repackaging								
Disposal	Disposal	Disposal	Waste Handling, Treatment, and Disposal	15	4.4	0.50	0.19	4.8	0.56	0.23
			Total	**22**						

[5] The facility assigned to OES – Repackaging, reported 0 lb of *o*-dichlorobenzene release to TRI. Exposure concentrations were modeled as 0.00 µg/m³

For the general population, EPA assumed that populations residing near facilities are exposed to modeled concentrations 24 hours a day, 365 days a year for a lifetime. For environmental exposures, ambient air concentrations at 100 m from the facility were evaluated.

Because of assumptions made for general population regarding exposure duration, exposure frequency, breathing rates, and other factors that are used to calculate exposure concentrations from modeled air concentrations, for this risk evaluation an individual's exposure concentration is equivalent to the modeled ambient, outdoor concentration from the IIOAC outputs. Therefore, the modeled daily and annual-average ambient air concentration results from IIOAC are equal to the acute and chronic exposure concentrations used to calculate acute and chronic non-cancer screening-level risk estimates.

Because EPA used the IIOAC modeled results as a screening-level analysis to see if one or more facilities/COUs may raise exposure (and associated risk) concerns, EPA used the IIOAC screening level results to derive screening-level acute non-cancer risk estimates in Section 4.3.4.1. The screening-level risk estimates were used to inform whether a higher-tier/more refined exposure analysis was warranted to confirm any screening-level exposure (and associated risk) concerns identified.

4.1.3.3 Summary of Drinking Water Exposures Assessment

Based on the concentrations of *o*-dichlorobenzene extracted from literature (U.S. EPA, 2026f), EPA conducted a screening-level approach for general population exposures using the highest concentration reported of 13.3 and 95 µg/L in surface water and groundwater, respectively, and highly conservative exposure parameters for daily drinking water intake rate and bodyweight to calculate dose for adults and infants (birth to <1 month). The calculated doses along with acute and chronic HEDs were used to calculate acute and chronic MOEs for screening-level risk estimates in Section 4.3.4.3.

4.1.3.4 Weight of Scientific Evidence Conclusions for General Population Exposure

EPA has robust confidence in the overall characterization of exposure in this general population exposure assessment and that the general population exposure scenarios represent a conservative upper bound. This confidence is based on the Agency's use of methodologies and models that previously underwent peer review and public comment. See Section 6.7 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for more details.

4.2 Summary of Human Health Hazard

Full details of the human health hazard assessment are provided in the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w) and *Draft Transcriptomic Assessment for o-Dichlorobenzene and p-Dichlorobenzene* (U.S. EPA, 2026aj). People may be exposed to *o*-dichlorobenzene as a liquid or vapor (U.S. EPA, 2026f). Based on physical and chemical properties and expected exposure scenarios, EPA quantitatively evaluated hazards via all exposure routes. Hazards were assessed through systematic review of reasonably available evidence, including human epidemiology, animal toxicology, and mechanistic data (including *in vitro* studies). Previous reviews by the U.S. and international government agencies were consulted for targeting the weight of scientific evidence analyses. To this end, EPA's 2006 Integrated Risk Information System (IRIS) *Draft Health Assessment of Dichlorobenzenes* and the Agency for Toxic Substances and Disease Registry's (ATSDR) 2006 *Toxicological Profile for Dichlorobenzenes* were used to identify the primary hazards and key studies. EPA independently reviewed and integrated all relevant studies identified in these assessments. These sources were supplemented by a literature search for all reasonably available information through September 2019 and an updated search through April 2025 that prioritized cancer data and screened using an updated population, exposure, comparator, and outcome (PECO) statement based on identified data gaps in the existing literature. See more details in the *Draft Systematic Review Protocol for o-*

Dichlorobenzene (U.S. EPA, 2026ae). The approach to screen the updated literature search for only cancer information was responsive to the incompleteness of the *o*-dichlorobenzene database for cancer information and consistent with EPA's previous conclusion that there is there is *inadequate information to assess carcinogenic potential*. The non-cancer literature database was supplemented by a new transcriptomics study performed in collaboration with the National Institute of Environmental Health Sciences (NIEHS) Division of Translational Toxicology (DTT) (2025a) that was custom-designed to address data gaps. Additionally, EPA performed a targeted search for repeated-dose studies related to respiratory toxicity as that was identified as an important data gap.

o-Dichlorobenzene is readily absorbed through the lungs and gastrointestinal tract. There are no dermal absorption studies for *o*-dichlorobenzene of acceptable data quality for quantitative use. Evidence from read-across to other isomers with dermal absorption data and modeling estimates suggest that *o*-dichlorobenzene has measurable but limited dermal absorption (2–4% fractional absorption)—especially when accounting for volatility of the substance from unoccluded skin. *o*-Dichlorobenzene is distributed throughout the body with greater partitioning or retention in adipose tissue, kidney, liver, and bladder. Metabolism is complex, with both phase 1 and phase 2 metabolism contributing significantly to the toxicokinetic identity of the chemical. It is likely that metabolism into bioactive metabolites contributes to the toxicity of *o*-dichlorobenzene.

The database for *o*-dichlorobenzene includes studies covering both inhalation and oral exposure routes across multiple species including rats, mice, rabbits, and guinea pigs. The epidemiological database is very limited. In reviewing the reasonably available evidence, EPA concluded that the weight of scientific evidence supported dose-response analysis on four non-cancer hazard outcomes: (1) respiratory system toxicity, (2) liver toxicity, (3) kidney toxicity, and (4) body weight changes.

TSCA section 4(h)(1) promotes the use of alternative test methods that reduce or replace vertebrate animals to the extent practicable when scientifically justified and in accordance with TSCA's science standards. Consistent with this mandate, EPA, on January 22, 2026, recommitted to phasing-out mammalian animal testing and further incorporating New Approach Methods (NAMs) into chemical risk evaluations.[6] This assessment exemplifies this commitment through an EPA collaboration with the DTT of the NIEHS to develop a 5-day, whole-body inhalation toxicology as well as a genomic dose-response study (U.S. EPA, 2026aj; NIEHS, 2025b). This study is a necessary bridge to validating approaches that can be used to phase out and replace traditional animal studies in the future

The 5-day study was performed in female B6D2F1/Crl mice and female Hsd:Sprague Dawley (SD) rats exposed to *o*-dichlorobenzene (NIEHS, 2025a). EPA independently analyzed the resulting transcriptomic data to characterize gene expression changes that can be plausibly associated with adverse toxicological outcomes based on available apical evidence (U.S. EPA, 2026aj). For *o*-dichlorobenzene, which had incomplete animal data, EPA developed a novel adaptation of the *Standard Methods for Development of EPA Transcriptomic Assessment Products (ETAPs)* (U.S. EPA, 2024c) that used existing mechanistic data to derive cellular process-specific transcriptomic PODs (tPODs) for mice and rats. A full description of the analyses and methods for analyzing the transcriptomic data and generating PODs can be found in EPA's *Supporting Hazard Characterization of 1,2-Dichlorobenzene and 1,4-Dichlorobenzene Using an EPA 5-Day in Vivo Transcriptomic Study Protocol* (U.S. EPA, 2026aj). These tPODs correspond with apical endpoints observed in the same organ systems identified in rodent toxicity studies. In selecting the best representative tPODs from each tissue, EPA was able to

[6] Administrator Zeldin Gets EPA Back on Track to Eliminate Animal Testing After Biden Admin Halted Phase Out, https://www.epa.gov/newsreleases/administrator-zeldin-gets-epa-back-track-eliminate-animal-testing-after-biden-admin; accessed March 11, 2026.

compare the tPODs and apical PODs to increase confidence in the values selected for use in risk estimation and to promote the use of the best available science. It was determined that the derived tPOD for liver toxicity (HEC of 7.48 ppm extrapolated to an HED of 8.26 mg/kg-day with a total uncertainty factor [UF] of 30) and the derived tPOD for lung toxicity (HEC 0.45 ppm with a total UF of 30) are a robust and representative estimates of adverse hazard thresholds for liver and respiratory toxicity, respectively. This novel approach will promote the future use and development of NAMs in chemical risk evaluations.

The best representative apical non-cancer endpoints and PODs were derived for inhalation, oral, and dermal routes corresponding to either acute, intermediate, or chronic exposure (Table 4-11). These PODs are associated with respiratory system toxicity and liver toxicity, and all values were adjusted to HECs/HEDs based on continuous/daily exposure. PODs were also derived for kidney toxicity and body weight changes but were not considered robust relative to respiratory and liver toxicity. The apical liver and respiratory toxicity effects do not appear to increase greatly across duration and may actually decrease in severity over time Therefore, EPA is developing a single hazard value per route representing each adverse effect that is applicable to all durations of exposure to *o*-dichlorobenzene (acute, intermediate, and chronic). Where systemic effects were not specific to a portal of entry, route-to-route extrapolation was utilized based on default exposure factors from EPA's EFH (U.S. EPA, 2011b). Adequate dermal toxicity studies were not available, therefore oral PODs were used for dermal exposure with absorption differences accounted for in the exposure assessment. The most appropriate POD for inhalation exposure is based on respiratory toxicity with an HEC of 0.45 ppm (2.71 mg/m^3) and total uncertainty factor (UF) of 30. The HED of 11 mg/kg (UF = 30) for liver toxicity is the most appropriate POD for oral and dermal exposure.

There is insufficient evidence from cancer bioassays to evaluate the carcinogenicity of *o*-dichlorobenzene using standard approaches as described in EPA *Guidelines for Carcinogen Risk Assessment* (U.S. EPA, 2005). Therefore, the Rethinking Chronic Toxicity and Carcinogenicity Assessment for Agrochemicals Project (ReCAAP) framework (OECD, 2024; Hilton et al., 2022) was employed to conduct a weight of scientific evidence evaluation integrating analog read-across, toxicokinetics, and mechanistic data to determine whether the absence of inhalation carcinogenicity studies imparts a significant gap in the human health risk assessments for *o*-dichlorobenzene. Based on the evidence integrated through this framework, EPA did not identify a human-relevant cancer hazard for *o*-dichlorobenzene and concluded that quantitative cancer risk assessment is not warranted because any additional cancer bioassays would be unlikely to provide evidence leading to a different conclusion. Since the integrated evidence does not indicate a likely cancer hazard, the Agency did not derive a specific cancer hazard value. Instead, EPA concluded that the selected non-cancer PODs—including tPODs that capture highly sensitive, early-stage biological responses—effectively bound the risk for more severe downstream outcomes. Therefore, these non-cancer PODs are considered protective of human health, including any potential carcinogenic effects.

4.2.1 Weight of Scientific Evidence Conclusions for Human Health Hazards

EPA evaluated the confidence for human health hazard conclusions based on the following factors: evidence integration conclusions, selection of the most critical endpoint and study, relevance to exposure scenarios, dose-response considerations, and incorporation of PESS. More details on how the Agency evaluated these factors are provided in Section 2.5 of the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w).

EPA has robust confidence in the *o*-dichlorobenzene inhalation POD for respiratory toxicity and the oral/dermal POD for liver toxicity. Ratings were moderate for the intermediate oral POD for liver toxicity and slight to moderate for intermediate inhalation PODs (which are only considered as a range for screening purposes). There is moderate to robust confidence for the chronic respiratory toxicity POD and robust confidence for the oral liver toxicity POD. EPA derived a single hazard value for applicable across all exposure durations (acute, intermediate, and chronic). Confidence in this single inhalation POD is robust, supported by consistent evidence from both apical studies and transcriptomic point of departure estimates developed using a novel adaptation of EPA's Transcriptomic Assessment Products (ETAP; accessed August 5, 2026) methods. Robust confidence was also assigned to the oral/dermal liver toxicity POD, supported by consistent apical and transcriptomic POD across multiple studies and species.

Although the existing cancer bioassay database is insufficient to evaluate carcinogenicity using standard approaches, the available evidence evaluated through the ReCAAP framework supports the conclusion that *o*-dichlorobenzene is unlikely to be carcinogenic to humans. Therefore, a quantitative cancer assessment is not warranted, and any additional cancer bioassays would be unlikely to provide evidence leading to different conclusions. Therefore, EPA did not derive a cancer hazard value for *o*-dichlorobenzene. The Agency has moderate-to-robust confidence in this conclusion.

Full details are provided in the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w).

4.2.2 Human Health Hazard Values

Table 4-11. PODs Used for Risk Estimation of Each Exposure Scenario and Route

Target Organ System (Route)	Species	Duration Range of Co-Critical Studies [a]	Effects Observed	HEC/D (units) [mg/m^3 if applicable]	Co-Critical PODs [a]	Reference(s)	Confidence in POD
Respiratory toxicity (inhalation)	Mice	4–90 days	Nasal olfactory tissue damage, mechanism-informed superset gene expression	BMDL = 0.45 ppm [b] (2.71 mg/m^3) based on U.S. EPA (2026aj); NIEHS (2025a)	**0.45 ppm (UF = 30)**	U.S. EPA (2026aj); NIEHS (2025a)	Robust
					2.0 ppm (UF = 100)	Cho et al. (2023)	
					4.3 ppm (UF = 300)	Zissu (1995)	
Liver toxicity (oral/dermal)	Mice, Rats	1- to 90-day oral studies	Increased liver weight, serum ALT, histopathology / mechanism-informed superset gene expression	$BMDL_{1SD}$ = 11 mg/kg-day based Umemura et al. (1996)	**11.0 mg/kg-day (UF = 30)**	Umemura et al. (1996)	Robust
					12.0 mg/kg-day (UF = 30)	Robinson et al. (1991)	
					8.26 mg/kg-day (UF = 30)	U.S. EPA (2026aj); NIEHS (2025a)	

Target Organ System (Route)	Species	Duration Range of Co-Critical Studies [a]	Effects Observed	HEC/D (units) [mg/m^3 if applicable]	Co-Critical PODs [a]	Reference(s)	Confidence in POD

ALT = alanine aminotransferase; BMDL = Lower confidence limit of the benchmark dose; HEC/D = human equivalent concentration/dose; POD = point of departure; UF = uncertainty factor

[a] Co-critical hazard values reflect converging evidence across studies when normalized for differences in UF. Given the similar hazard values across studies of varying exposure duration, a single POD was applied for use in risk estimation of all exposure durations.

[b] An 8-hour HEC of 1.35 ppm was applied for appropriate consumer scenarios (adjusting from 24 to 8 hours/day exposure) to better align with expected exposure durations.

Bold indicates the co-critical POD option selected for use in risk estimation.

4.3 Human Health Risk Characterization

4.3.1 Risk Assessment Approach

Table 4-12. Use Scenarios, Populations of Interest, and Toxicological Endpoints Used for Acute, Intermediate, and Chronic Exposures

Population of Interest and Exposure Scenarios	***Workers and Occupational Non-Users (ONUs)*** EPA estimated risks to workers and ONUs 16+ years via inhalation and dermal exposure following acute, intermediate, and chronic exposures.
	General Population Exposed to Environmental Releases EPA estimated risks to the general population following acute or chronic inhalation or oral drinking water exposure of any lifestage living near facilities releasing *o*-dichlorobenzene into the environment.
	Consumers EPA estimated risks to consumers of all ages exposed for acute, intermediate, or chronic exposures via inhalation and for consumers 16+ years via dermal routes to products containing *o*-dichlorobenzene.
Dermal Exposure Scenarios	***Fractional Absorption*** • Applied to exposure scenarios with a finite loading dose Fractional absorption = 4% when the weight fraction of *p*-dichlorobenzene is >50% and 2% when the weight fraction is <50%.
	Flux Rate/Permeability Absorption • Applied to exposure scenarios with an infinite/nondepletable loading dose Peak flux rate = 36.9 µg/cm^2-h based on 10-min of exposure (K_p = 3.8E−04 cm/h).
Health Effects, Hazard Values and Uncertainty Factors	***Non-Cancer PODs for Acute, Intermediate, and Chronic Risk Estimates*** • Adjusted for continuous/daily exposure (24 hour/day, 7 days/week) • Benchmark margin of exposure (MOE) = 30 (3× [UF_A] and 10× [UF_H]) *Acute* Inhalation HEC = 0.45 ppm (2.71 mg/m^3) for respiratory toxicity; an 8-hour HEC of 1.35 ppm applied for consumer scenarios (adjusting from 24 to 8 hours/day exposure). Oral HED = 11 mg/kg-day for liver toxicity *Intermediate* Inhalation HEC = 0.45 ppm (2.71 mg/m^3) for respiratory toxicity Oral HED = 11 mg/kg-day for liver toxicity *Chronic* Inhalation HEC = 0.45 ppm (2.71 mg/m^3) for respiratory toxicity Oral HED = 11 mg/kg-day for liver toxicity

HEC/D = human equivalent concentration/dose; UF_A = interspecies uncertainty factor; UF_H = intraspecies uncertainty factor.

4.3.1.1 Non-Cancer Risk Calculations

EPA used an MOE approach to identify potential non-cancer risks. The MOE is the ratio of the non-cancer hazard value (or POD) divided by a human exposure dose. The chronic MOEs for non-cancer inhalation risks were calculated using Equation 4-1. Cancer risks were not estimated because cancer hazard was not identified.

Equation 4-1. Margin of Exposure Calculation

$$MOE = \frac{Non\text{-}Cancer\ Hazard\ Value\ (POD)}{Human\ Exposure}$$

Where:

MOE	=	Margin of exposure for acute, short-term, or chronic risk comparison (unitless)
Non-cancer Hazard Value (POD)	=	Human equivalent concentration (HEC, $\mu g/m^3$)
Human Exposure	=	Exposure estimate ($\mu g/m^3$), adjusted specific to the population and exposure scenario to match the hazard value

The above equation is generalized. However, comparing a single hazard value with exposures for varied populations and exposure scenarios, risk calculations require adjustment of the exposure estimate to match assumptions inherent in the hazard value. This is especially true for inhalation risks, which must match both exposure duration and exposure factors such as breathing rate. Exposure adjustments are described and applied to risk calculator files accordingly (U.S. EPA, 2026h, j, 2026ac). MOE risk estimates may be interpreted in relation to benchmark MOEs. Benchmark MOEs are typically the total uncertainty factor (UF) for each non-cancer POD. The MOE estimate is interpreted as a human health risk of concern if the MOE estimate is less than the benchmark MOE (*i.e.,* the total UF). On the other hand, for this screening level analysis, if the MOE estimate is equal to or exceeds the benchmark MOE, the exposure pathway is not analyzed further. Typically, the larger the MOE, the more unlikely it is that a non-cancer adverse effect occurs relative to the benchmark. When determining whether a chemical substance presents unreasonable risk to human health or the environment, calculated risk estimates are not "bright-line" indicators of unreasonable risk, and EPA uses discretion to consider other risk-related factors in addition to risks identified in the risk characterization.

4.3.2 Risk Estimates for Workers

This section provides discussion and characterization of risk estimates for workers and ONUs from both central tendency and high-end inhalation and dermal exposures. Workers are expected to directly handle the chemical while ONUs are expected to be in the same area as the chemical, but it is assumed that they do not directly handle it. Risks are calculated for exposed workers and ONUs based on the *o*-dichlorobenzene-derived PODs described in Section 4.2.

Table 4-1 summarizes the inhalation and dermal MOEs used to characterize non-cancer risks for acute exposures to *o*-dichlorobenzene. Toxicity does not accumulate from repeated exposures. Instead, respiratory toxicity and liver toxicity demonstrate the same or decreasing severity over time. In other words, the acute, single-day studies provide more sensitive or equally sensitive endpoints compared to repeat dosing studies in laboratory animals. As such, EPA has determined that evaluation of risks from a single day (*i.e.*, acute) exposure is protective for intermediate and chronic exposures and only acute risks are presented. For comparison, supplemental risk calculator files include risk estimates for all durations based on traditional averaging time adjustments (which mathematically results in lower exposures and risks for intermediate and chronic duration) (U.S. EPA, 2026h, 2026ac). Note that both the central tendency and high-end estimations are expected to be reflective of the range for worker inhalation exposures for acute exposures which may occur over a single day.

Calculated risk estimates are not bright-line indicators of unreasonable risk relative to benchmarks, and EPA uses discretion, including consideration of uncertainties, to consider other risk-related factors in addition to risks identified in the risk characterization. Appendix F presents the derivation of the existing chemical occupational exposure value (OEV), which summarizes the OES and health endpoints into a single value, as well as the LOD for available governmental air sampling analytical methods.

4.3.2.1 Occupational Risk Estimates

Inhalation risk estimates for occupational COUs are summarized in Table 4-13. Risk estimates are shown both without any respirator use as well as how the risk estimate would change with full-shift respirator use. Risk estimates are bolded when they are below the benchmark MOE of 30. The assigned protection factors (APFs) in parentheses represent the minimum respiratory protection or other quantitative reduction in inhalable air concentration/dose needed to increase the MOE above the benchmark. Thus, the adjusted MOE corresponds to the lowest APF that meets this threshold. EPA also incorporated available information on the real-world application of respiratory protection for each exposure scenario and population (see footnotes for each population). Risk estimates for dermal exposure are shown assuming no glove use. EPA considered glove use for these exposure scenarios and exposed populations based on available information (see footnotes for each population); however, a reduction in dermal exposure from glove use cannot be quantified based on specific protection factors.

Table 4-13. Occupational Risk Summary Table

Conditions of Use (COU): Life Cycle Stage / Category	Conditions of Use (COU): Subcategory	Occupational Exposure Scenario (OES)	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)[j]: Risk Estimates for No PPE – Acute	Non-Cancer Risk Estimates (Benchmark = 30)[j]: Risk Estimates with PPE – Acute
Manufacture/ Domestic Manufacturing[a]	Domestic manufacture	Manufacturing	Workers and Occupational Non-Users (ONUs)[c d e g i]	Inhalation and Dermal	Central Tendency	–	–
					High-End	–	–
Manufacture/ Import	Import	Repackaging	Worker-Polymer Chemical Operators[e]	Inhalation 8-hour time-weighted average (TWA)	Central Tendency	65	PPE not needed
					High-End	**5.7**	57 (APF 10)
			Worker- Copolymer Chemical Operators[e]	Inhalation 8-hour TWA	Central Tendency	61	PPE not needed
					High-End	**6.4**	64 (APF 10)
			Average Adult Worker[g h]	Dermal	Central Tendency	34	N/A
					High-End	**14**	
			ONU[f]	Inhalation 8-hour TWA	Single Data Point	69	N/A
Processing/ Repackaging	Processing – Repackaging	Repackaging	Worker-Polymer Chemical Operators[e]	Inhalation 8-hour TWA	Central Tendency	65	PPE not needed
					High-End	**5.7**	57 (APF 10)
			Worker- Copolymer Chemical Operators[e]	Inhalation 8-hour TWA	Central Tendency	61	PPE not needed
					High-End	**6.4**	64 (APF 10)
			Average Adult Worker[g h]	Dermal	Central Tendency	34	N/A
					High-End	**14**	
			ONU[f]	Inhalation 8-hour TWA	Single Data Point	69	N/A
Processing/ As a reactant	Processing as a reactant	Processing as a Reactant	Material Handlers[e]	Inhalation 12-hour TWA	Central Tendency	**29**	286 (APF 10)
					High-End	**1.4**	34 (APF 25)
			Process Field Operators[c]	Inhalation 12-hour TWA	Central Tendency	205	PPE not needed
					High-End	34	

Conditions of Use (COU)		Occupational Exposure Scenario (OES)	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)[j]	
Life Cycle Stage / Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute	Acute
Processing/ As a reactant	Processing as a reactant	Processing as a Reactant	Lab Technicians[e]	Inhalation 12-hour TWA (using *p*-dichlorobenzene data as surrogate)	Central Tendency	**15**	150 (APF 10)
					High-End	**7.7**	77 (APF 10)
			Lab Technicians[e]	Inhalation 8-hour TWA (using 1,1,2-TCA data as surrogate)	Central Tendency	1.2E04	PPE not needed
					High-End	131	PPE not needed
			Lab Technician[e]	Inhalation 12-hour TWA (using 1,1,2-TCA data as surrogate)	Central Tendency	3.5E04	PPE not needed
					High-End	822	PPE not needed
			Average Adult Worker[g]	Dermal	Central Tendency	34	N/A
					High-End	**14**	
			ONU[f]	Inhalation 12-hour TWA	Central Tendency	**28**	N/A
					High-End	**14**	
Processing/ incorporation into formulation, mixture or reaction product	Incorporation into soap, cleaning compound, and toilet preparation manufacturing	Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing	Average Adult Worker[e]	Inhalation 8-hour TWA	Central Tendency	**4.8**	48 (APF 10)
					High-End	**1.2**	59 (APF 50)
			Average Adult Worker[i]	Dermal	Central Tendency	34	N/A
					High-End	**14**	
			ONU[f]	Inhalation 8-hour TWA	Central Tendency	**4.8**	N/A
					High-End	**4.8**	
	Use of solvents in printing ink manufacturing; paint and coating manufacturing; synthetic dye and pigment manufacturing	Incorporation into Formulation, Mixture, or Reaction Product	Average Adult Worker[e]	Inhalation 8-hour TWA	Central Tendency	**6.0**	60 (APF 10)
					High-End	**0.14**	135 (APF 1,000)
			Average Adult Worker[i]	Dermal	Central Tendency	529	N/A
					High-End	129	
			ONU[f]	Inhalation 8-hour TWA	Central Tendency	**6.0**	N/A
					High-End	**6.0**	N/A

Conditions of Use (COU)		Occupational Exposure Scenario (OES)	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30) [j]	
Life Cycle Stage / Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute	Acute
Processing/ Incorporation into formulation, mixture or reaction product	Incorporation into solvents (which become part of product formulation or mixture in plastic material and resin manufacturing)	Plastics Compounding [a]	Workers and ONUs	Inhalation and Dermal	Central Tendency	–	–
					High-End	–	–
Processing/ Incorporation into article	Incorporation into articles – Other, including in plastic product manufacturing	Plastics Converting [a]	Workers and ONUs	Inhalation and Dermal	Central Tendency	–	–
					High-End	–	–
Industrial Use/ Functional fluids (closed system)	Functional fluids (closed system) in all other basic chemical manufacturing	Functional Fluids (Closed System)	Average Adult Worker [e]	Inhalation 12-hour TWA	Central Tendency	64	PPE not needed
					High-End	**4.9**	49 (APF 10)
			Average Adult Worker [g h]	Dermal	Central Tendency	43	N/A
					High-End	**17**	
			ONU [f]	Inhalation 12-hour TWA	Central Tendency	64	N/A
					High-End	64	
Industrial Use/ Use of solvents in printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing	Non-incorporative activities – Processing aids, not otherwise listed	Industrial Use of Solvents	Polymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	66	449 (APF 10)
					High-End	**6.0**	60 (APF 10)
			Copolymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	61	PPE not needed
					High-End	**6.4**	64 (APF 10)
			Maintenance Mechanics and Electricians [e]	Inhalation 8-hour TWA	Central Tendency	156	PPE not needed
					High-End	**12**	120 (APF 10)

Conditions of Use (COU)		Occupational Exposure Scenario (OES)	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30) [j]	
Life Cycle Stage / Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute	Acute
Industrial use/ Use of solvents in printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing	Non-incorporative activities – Processing aids, not otherwise listed	Industrial Use of Solvents	Average Adult Worker [g h]	Dermal	Central Tendency	32	N/A
					High-End	**13**	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	87	N/A
					High-End	**12**	
Commercial use/ Use of ink, toner, and colorant products\	Use of ink, toner, and colorant products	Use of Ink, Toner, and Colorant Products	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	80	PPE not needed
					High-End	**18**	177 (APF 10)
			Average Adult Worker [i]	Dermal	Central Tendency	485	N/A
					High-End	148	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	80	N/A
					High-End	80	
Commercial use/ Use of coatings and paints, thinner, paint removers	Use of coatings and paints, thinners, paint removers	Use of Paints and Coatings	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	**5.9**	59 (APF 10)
					High-End	**0.18**	180 (APF 1,000)
			Average Adult Worker [e]	Dermal	Central Tendency	405	N/A
					High-End	101	
			ONU [i]	Dermal	Central Tendency	677	N/A
					High-End	259	
			ONU [f]	Inhalation	Central Tendency	**5.9**	N/A
					High-End	**5.9**	
Commercial use/Use of paint thinners and removers	Use of paint thinners and removers	Use of Paint Thinners and Removers	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	265	PPE not needed
					High-End	133	

Conditions of Use (COU)		Occupational Exposure Scenario (OES)	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30) [j]	
Life Cycle Stage / Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute	Acute
Commercial use/Use of paint thinners and removers	Use of paint thinners and removers	Use of Paint Thinners and Removers	Average Adult Worker [i]	Dermal	Central Tendency	527	N/A
					High-End	130	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	265	N/A
					High-End	265	
Commercial use/ Use of lubricants and greases	Use of lubricants and greases	Use of Lubricants and Greases	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	101	PPE not needed
					High-End	**19**	192 (APF 10)
			Average Adult Worker [i]	Dermal	Central Tendency	3,945	N/A
					High-End	1,007	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	101	N/A
					High-End	101	
Commercial use/ Use as a fuel additive	Use as a fuel additive	Use of Fuels and Related Products	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	2.1E05	PPE not needed
					High-End	9,640	
			Average Adult Worker [i]	Dermal	Central Tendency	2.5E04	N/A
					High-End	7,401	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	2.1E05	N/A
					High-End	2.1E05	
Commercial use/ Air care products	Use in continuous action air fresheners	Use in Solid Air Care Products	Average Adult Worker [e]	Inhalation 8-hour TWA	N/A [b]	259	PPE not needed
			Average Adult Worker [g]	Dermal	N/A [b]	52	N/A
Commercial use/ Other use	Laboratory chemicals; Cleaning and furnishing care products	Use of Laboratory Chemicals	Average Adult Worker [e]	Inhalation 12-hour TWA (using *p*-dichlorobenzene as surrogate)	Central Tendency	**15**	150 (APF 10)
					High-End	**7.4**	74 (APF 10)
				Inhalation 8-hour TWA (using 1,1,2-TCA as surrogate)	Central Tendency	1.2E04	PPE not needed
					High-End	131	

Conditions of Use (COU)		Occupational Exposure Scenario (OES)	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30) [j]	
Life Cycle Stage / Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute	Acute
Commercial use/ Other use	Laboratory chemicals; Cleaning and furnishing care products	Use of Laboratory Chemicals	Average Adult Worker [e] (*continued*)	Inhalation 12-hour TWA (using *p*-dichlorobenzene as surrogate)	Central Tendency	3.5E04	PPE not needed
					High-End	822	PPE not needed
			Average Adult Worker [h]	Dermal	Central Tendency	128	N/A
					High-End	**19**	
			ONU [f]	Inhalation 128-hour TWA (using *p*-dichlorobenzene as surrogate)	Central Tendency	**15**	N/A
					High-End	**15**	N/A
				Inhalation 8-hour TWA (using 1,1,2-TCA as surrogate)	Central Tendency	1.2E04	N/A
					High-End	1.2E04	
				Inhalation 12-hour TWA (using 1,1,2-TCA as surrogate)	Central Tendency	3.5E04	N/A
					High-End	3.5E04	
		Use of Cleaning and Furnishing Care Products	Average Adult Worker [e]	Inhalation 8-hour TWA	Single data point	**4.5**	45 (APF 10)
			Average Adult Worker [i]	Dermal	Central Tendency	34	N/A
					High-End	**14**	
		Use of Other Cleaning Products	Average Adult Worker [e]	Inhalation 8-hour TWA (assuming 8 hours exposure	Low-End [b]	**9.2E−02**	92 (APF 1,000)
					High-End [b]	**1.2E−02**	**12 (APF 1,000)**
				Dermal	Low-End	38	N/A
					High-End	**15**	
Commercial use/Sheep branding fluid	Sheep branding fluid	Sheep Branding Fluid	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency [b]	–	–
					High-End [b]	1,636	–
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	–	–
					High-End	–	–

Conditions of Use (COU)		Occupational Exposure Scenario (OES)	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30) [j]	
Life Cycle Stage / Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute	Acute
Commercial use/Sheep branding fluid	Sheep branding fluid	Sheep Branding Fluid	Average Adult Worker [i]	Dermal	Central Tendency	349	N/A
					High-End	117	
Disposal	Disposal	Disposal	Average Adult Worker [e]	Inhalation 12-hour TWA	Central Tendency	39	PPE not needed
					High-End	**20**	195 (APF 10)
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	40	N/A
					High-End	**20**	
			Average Adult Worker [g]	Dermal	Central Tendency	1,262	N/A
					High-End	492	

1,1,2-TCA = 1,1,2-trichloroethane; APF = assigned protection factor; PPE = personal protective equipment
[a] Exposures were not quantified for these OESs; however exposures are expected to be negligible (Section 4.3.2.1.1).
[b] The inhalation exposures for these OESs were estimated using IECCU (air care products) and CEM (sheep branding fluid), which do not specify between central tendency and high end exposure, nor between workers and ONUs.
[c] Available data for this OES and/or population reports that chemical respirators are used.
[d] Available data for this OES and/or population reports that available respiratory protection is either only for emergency use (escape respirator) or is likely only protective of particulates (N95, medical masks).
[e] No information indicating respirator use of any kind was available.
[f] Respirator use is assumed to not be applicable for ONUs in the absence of population-specific information.
[g] Available data for this OES and/or population reports that gloves are routinely indicated or expected.
[h] Glove use was reported as either rarely/inconsistently used or was only recommended by the manufacturer without any evidence of regular use.
[i] No information indicating glove use of any kind was available and regular glove use would not be expected.
[j] Risk estimates that exceed the benchmark (*i.e.,* non-cancer risks less than the risk benchmark) are **bolded/shaded**.

4.3.2.1.1 Risk Characterization for Workers and ONUs by OES

Manufacturing

This OES covers COUs covered under the Manufacturing OES (*i.e.,* Manufacturing: Manufacture: Domestic manufacture). *o*-Dichlorobenzene is unintentionally manufactured as a byproduct during the production of vinyl chloride monomer (VCM). It may also be produced when manufacturing herbicides, 3,4-dichloroaniline, and isocyanates used to make polyurethane. Data from the manufacturing process of VCM was considered when conducting this assessment, and it is assumed to be representative of all cases when *o*-dichlorobenzene is manufactured as a byproduct. Note that the Import COU is covered in the Repackaging OES below.

This OES is based on information received as part of inhalation test order data for the isomer *p*-dichlorobenzene since *o*-dichlorobenzene is commonly produced as a byproduct with *p*-dichlorobenzene, and because the two isomers have similar physical and chemical properties. The monitoring data are from one facility under the control of Westlake Corporation, which manufactures *p*-dichlorobenzene and a mixture of other isomers as a byproduct of their VCM Per-Tri production process. Communications from Westlake Corporation indicated that *o*-dichlorobenzene is a minority of the mixture, with *p*-dichlorobenzene comprising at least 50% and *o*-dichlorobenzene comprising most of the rest. *p*-Dichlorobenzene and *o*-dichlorobenzene have similar physical and chemical properties, both with a vapor pressure of approximately 1 mm Hg (U.S. EPA, 2026f). Therefore, while there is insufficient information available for quantifying air concentrations and dermal exposure estimates for *o*-dichlorobenzene, EPA is confident that exposures must be lower than they would be for *p*-dichlorobenzene, for which not a single measurement was detected above the LOD (LODs 20–40 ppb range). EPA applied exposure estimates for *p*-dichlorobenzene by assessing the maximum LOD as the high-end and half the maximum LOD as the central tendency TWA exposure concentrations for each SEG, according to *Guidelines for Statistical Analysis of Occupational Exposure Data*. Even with these health-protective assumptions, the *Draft Risk Evaluation for p-Dichlorobenzene* did not identify unreasonable risk for the manufacturing of *p*-dichlorobenzene and all but one risk estimate exceeded the benchmark of 30 (1 high-end risk estimate was calculated as 29). Therefore, EPA has determined that exposures from manufacturing of *o*-dichlorobenzene as a byproduct are negligible and human health risks are unlikely.

Preliminary review of 2024 CDR data indicates that *o*-dichlorobenzene has also been domestically manufactured as a primary product in recent years; EPA intends to incorporate 2024 CDR data and other reasonably available information regarding domestic manufacture of *o*-dichlorobenzene into the final risk evaluation.

Repackaging

This OES covers COUs covered under the Repackaging OES (*i.e.,* Manufacturing: Import; Processing: Repackaging). For this OES, both inhalation and dermal routes of exposure result in risk estimates below benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about personal protective equipment (PPE) needed to mitigate risk for each OES.

The high-end and central tendency worker inhalation exposure estimates for these OES are based on test order inhalation data from SABIC Innovative Plastics. The test order data included a total of 28 8-hour personal air samples taken between April and May of 2024, along with 2 occupational task-based personal air samples. Of these data, 15 8-hour samples and the 2 task-based samples had associated task descriptions containing "Connect/disconnect transfer hoses to intermodal containers." These data points were deemed by EPA to be relevant to repackaging activities and included under this OES (SABIC, 2024). The TWA data were split between three SEGs: Polymer Chemical Operators, Copolymer Chemical Operators, and ONUs. For 8-hour TWA concentrations for Polymer Chemical Operators, the SABIC data contained eight samples, all samples were reported above the LOD. For this subset of data, the median and 95th percentile were used to represent a central tendency and high-end estimate, respectively. For Copolymer Chemical Operators, the SABIC data contained six samples, one sample was below the limit of detection—this non-detect (ND_ sample was estimated as the LOD/2 due to the standard deviation of the dataset (see Section 4.1.1.1 for more details). For this subset of data, the median and 95th percentile were used to represent a central tendency and high-end estimate, respectively. There was a single ONU sample mapped to this OES, which was detect for *o*-dichlorobenzene. Because there was only one sample relevant to this OES, EPA presented the single exposure value instead of a high-end and a central tendency concentration (SABIC, 2024). See Section 4.1.1.1 for more details on how number of samples and non-detects are accounted for in each dataset.

There is uncertainty as the monitoring data are not from dedicated repackaging sites but rather from workers performing tasks similar to those expected to take place at repackaging sites, such as connecting and disconnecting transfer hoses from containers. EPA also assumed 250 exposure days/year for 8-hour shifts based on a typical worker schedule; it is uncertain whether this captures actual worker schedules and exposures. Although operations for this OES are mostly performed in a closed system, worker activities like connecting and disconnecting hoses presents an opportunity for dermal exposure to workers' hands. EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. The Agency modeled dermal exposure using a fraction absorbed value of 0.04 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

EPA assessed the concentration of *o*-dichlorobenzene in the liquid product as a uniform distribution from 90 to 100% based on data provided by the 2020 CDR (U.S. EPA, 2020a). The Agency used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 ("upper bound" represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical, and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Repackaging OES, both central tendency and high-end estimates are expected to be reflective of the range for worker inhalation exposures since the data are actual monitoring data and there is potential for a worker to be exposed to the entire range of exposures.

Processing as a Reactant

This OES covers COUs covered under the Processing as a Reactant OES (*i.e.,* Processing: Processing as a Reactant; Processing: Processing – incorporation into formulation, mixture or reaction product: Intermediates in all other basic organic chemical manufacturing). For this OES, both inhalation and dermal routes of exposure result in risk estimates below the benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

The high-end and central tendency worker inhalation exposure estimates for this OES are based on surrogate monitoring data from *p*-dichlorobenzene because the two isomers have similar physical and chemical properties. Both chemicals require comparable corrosion-resistant equipment, vapor control systems, and thermal separation operations due to their similar volatility, low flash points, and corrosive processing environments. Therefore, *o*-dichlorobenzene is expected to be present at concentrations like *p*-dichlorobenzene during this OES since both isomers are handled under highly similar industrial conditions. Occupational inhalation data for *p*-dichlorobenzene during processing as a reactant were provided via a data submission from the ACC [American Chemistry Council] Consortium, which includes processors of *p*-dichlorobenzene (ACC, 2023). EPA estimated inhalation exposures from two processing facilities. From this monitoring data, EPA calculated central tendency and high-end exposure estimates. For material handlers, the ACC Consortium data contained five 12-hour TWA concentration samples, all of which were detected above the method's LOD. For this subset of data, the median and maximum of the dataset were used to represent a central tendency and high-end estimate, respectively (see Section 4.1.1.1 for more detail on how central tendency and high-end are determined for different datasets). For process field operators, 26 samples were collected. Of the 26 samples, 24 were below the method's LOD, or non-detect. For the non-detect samples, EPA assumed concentrations of half the LOD. EPA calculated the 50th and 95th percentile 12-hour TWA concentrations representing the central tendency and high-end estimate of potential occupational inhalation exposures, respectively.

All nine Laboratory Technician (assessed as 12-hour TWA) datapoints were reported non-detects for *p*-dichlorobenzene (LOD 0.0041–0.057 ppm) in the ACC Consortium data. In this surrogate assessment, EPA used the maximum LOD (0.057) as the assumed high-end of exposure, and half the maximum LOD as the central tendency. This method, despite being all non-detects, resulted in MOEs below the benchmark MOE. All the inhalation data being non-detects adds uncertainty to the exposure but there is high confidence that the occupational exposure estimates are upper bound. Because of the lack of detected samples, EPA also estimated exposure from this SEG using surrogate monitoring data from 1,1,2-trichloroethane (Labcorp Early Development, 2023). The Vinyl Institute provided the surrogate monitoring data for 1,1,2-trichloroethane to EPA in response to a test order. The data included a worker job title of "Laboratory Technician," which EPA determined as relevant to this OES. In total, the data provided by the Vinyl Institute included 29 full-shift worker PBZ (personal breathing zone) air samples along with 23 short-term samples taken between July and October 2023. Vinyl Institute data for Laboratory Technicians included both 8- and 12-hour TWAs, and both results are presented in this assessment. For 8-hour TWA concentrations for Laboratory Technicians, the Vinyl Institute data contained seven samples, two were below the limit of detection. For 12-hour TWA concentrations for Laboratory Technicians, the Vinyl Institute data contained 22 samples, eight were below the LOD. All non-detect samples were estimated as the LOD/2 due to the standard deviation of the datasets (see Section 4.1.1.1). For this subset of data, the median and 95th percentile were used to represent a central tendency and high-end estimate, respectively.

For estimating ONU exposures, EPA used the ACC Consortium data for *p*-dichlorobenzene as surrogate, which contained 22 ONU samples (12-hour TWA) that were all reported non-detects for *p*-dichlorobenzene (LOD 0.0041–0.03 ppm). EPA assessed the LOD and half the LOD as the high-end and central tendency TWA exposure concentrations, respectively according to *Guidelines for Statistical Analysis of Occupational Exposure Data* (ACC, 2023).

In all cases, the exposure estimates were corrected based on differences in vapor pressure to estimate exposure estimates for *o*-dichlorobenzene (CEB, 1991). There is uncertainty as to whether the measured concentrations and exposure frequencies from the industry sources accurately represent the entire industry and the true distribution of inhalation concentrations in this scenario. Also, EPA assumed 200 exposure days per year for 12-hour shifts based on information provided from ACC. For other data that did not have industry-specific exposure days per year, EPA used the defaults of 250 days for 8-hour shifts and 167 days for 12-hour shifts. It is uncertain whether this captures actual worker schedules and exposures.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.04 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment of o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene in the liquid product as a uniform distribution from 90 to 100% based on import data provided by the 2020 CDR as presumably the chemical arrives at site as a neat substance before it is processed as a reactant (U.S. EPA, 2020a). The Agency used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because (1) an ONU is not expected to directly handle the chemical, and (2) airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Processing as a Reactant OES, both central tendency and high-end estimates are expected to be reflective of the range for worker inhalation exposures since the data are surrogate monitoring data collected at an actual facility and there is potential for a worker to be exposed to the entire range of exposures. Because most values are non-detects, the central tendency is sensitive to how censored data are treated. For workers, the high-end is anchored to detected values and is therefore less sensitive to non-detect treatment. Where all results are non-detects (*e.g.*, ONUs), both central tendency and high-end are constrained by the LOD and carry higher uncertainty.

Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing

This OES covers COUs covered under the Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing OES (*i.e.,* Processing: Processing – Incorporation into formulation, mixture or reaction product: Soap, cleaning compound, and toilet preparation manufacturing). For this OES, both inhalation and dermal routes of exposure result in risk estimates below benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

The high-end and central tendency worker inhalation exposure estimates for this OES are based on occupational inhalation data from OSHA's CEHD database (OSHA, 2019). The data included five full-shift PBZ samples taken in May 1994 from one site under the Standard Industrial Classification (SIC) code 2842 – Specialty Cleaning, Polishing, and Sanitations Preparations. None of the five samples were below the method's LOD. From this monitoring data, EPA calculated the 50th percentile and maximum 8-hour TWA concentrations representing the central tendency and high-end estimate of potential occupational inhalation exposures, respectively, for this scenario. (See Section 4.1.1.1 for more detail on how central tendency and high-end are determined for different datasets.) In absence of data specific to ONU exposure, EPA assumed that worker central tendency exposure was representative of ONU exposures. There is uncertainty as to whether the measured concentrations and exposure frequencies from one site accurately represent the entire industry and the true distribution of inhalation concentrations in this scenario. Also, EPA assumed 8 exposure hours per day and 250 exposure days per year based on continuous exposure during each working day for a typical worker schedule; it is uncertain whether this captures actual worker schedules and exposures.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.04 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene in the liquid product as a uniform distribution from 90 to 100% based on import data provided by the 2020 CDR as presumably the chemical arrives at site as a neat substance before it is formulated into the product (U.S. EPA, 2020a). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical, and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing OES, both central tendency and high-end estimates are expected to be reflective of the range for worker inhalation exposures since the data are actual monitoring data and there is potential for a worker to be exposed to the entire range of exposures.

Incorporation into Formulation, Mixture, or Reaction Product

This OES covers COUs covered under the Incorporation into Formulation, Mixture, or Reaction Product OES (*i.e.,* Processing: Processing – Incorporation into formulation, mixture or reaction product: Solvents [which become part of product formulation or mixture]). Note that this is one of three OESs that covers this COU, the other two being Plastic Compounding and Plastic Converting, which are discussed later in this section. For this OES, the inhalation route of exposure results in risk estimates below benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES.

The high-end and central tendency worker inhalation exposure estimates for this OES are based on two sources that EPA identified during the systematic review process. The first source EPA evaluated was Volume 73 of the *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, which was drafted by the World Health Organization (WHO) International Agency for Research on Cancer (IARC) (IARC, 1999). The IARC report cited data from two previous *o*-dichlorobenzene exposure studies and provided the ranges of concentrations measured. The first reference was a 1990 report by the German Chemical Society that measured airborne concentrations of *o*-dichlorobenzene used as a solvent in a dye manufacturing plant in Germany. Results from this study ranged from 0.3 to 14 mg/m^3; however, the report does not provide information on whether these data are full-shift or task-based PBZ estimates. Because of this, these data points were not used in this assessment. The other study cited in the IARC report was a 1997 Japanese study by Kumagai and Matsunaga that presented 28 8-hour TWA PBZ samples for 10 workers collected at a plant that synthesized intermediate products for dyes. The measured *o*-dichlorobenzene concentrations ranged between 0.1 and 2.3 ppm (only the minimum and maximum values provided) (IARC, 1999). The second source EPA identified during systematic review was a 1984 industrial hygiene survey conducted by Dow Chemical at their Michigan Division Chlorobenzol Plant (Dow Chemical, 1984). A total of 77 PBZ full-shift TWA samples were taken, 76 of which were reported to have measured *o*-dichlorobenzene concentrations under 5 ppm and 8 below the method's LOD. The study is a microfiche scan of the original document and the raw data presented is illegible; however, Table 4 in that report provides legible concentration ranges for the 5 exposure groups, representing 44 samples (6 reported as NDs), established by the researchers: Badger Operator (ND–0.18 ppm, 8 total samples with 1 ND), Chlorinator Operator (0.05–0.11 ppm, 6 total samples), Tri-Tetrachlor Operator (ND – 0.17 ppm, 8 total samples with 1 ND), Still Operator (0.85–5.7 ppm, 9 total samples), and Chlorobenzol Operator (ND–0.06 ppm, 13 samples with 4 NDs). The remaining samples belonged to other categories that did not have ranges provided. The reported limit of detection was 0.05 ppm. Because two data points from the IARC report fell within the range of values reported in the Dow Chemical survey, the Agency decided to combine the two sources to create a dataset for this OES consisting of 12 data points. Half the LOD (0.025) was used in place of the three "minimum" samples that were non-detects from the Dow Chemical survey. Using the 12 total samples, EPA calculated a central tendency value of 0.11 ppm using the 50th percentile of the data points; the high-end was calculated as 4.85 ppm, the 95th percentile of the maximums of each range reported by the studies. Note that when only considering the Dow Chemical survey, the exposure results lower slightly with the central tendency becoming 0.09 ppm, and the high-end becoming 4.60 ppm. In absence of data specific to ONU exposure, EPA assumed that worker central tendency exposure was representative of ONU exposures.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.02 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). The Agency assessed the concentration of *o*-dichlorobenzene in the liquid product as a uniform distribution from 1 to 30% based on data provided by the Sun Chemical as part of the 2020 CDR submission (U.S. EPA, 2020a). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Incorporation into Formulation, Mixture, or Reaction Product OES, both central tendency and high-end estimates are expected to be reflective of the range for worker inhalation exposures since the data are actual monitoring data collected and there is potential for a worker to be exposed to the entire range of exposures.

Plastic Compounding and Plastic Converting

These OESs cover part of the COU of Processing: Processing – Incorporation into formulation, mixture or reaction product: Solvents (which become part of product formulation or mixture). Note that these are two of three OESs that cover this COU, the other being Incorporation into Formulation, Mixture, or Reaction Product which is discussed in the preceding subsection, and is based on information received as part of inhalation test order data for the isomer *p*-dichlorobenzene because (1) *o*-dichlorobenzene is commonly present with *p*-dichlorobenzene, and (2) both isomers have similar physical and chemical properties.

The monitoring data are from one facility that uses PPS resin in one of their facilities. PPS is manufactured by processing *p*-dichlorobenzene as a reactant. *p*-Dichlorobenzene is expected to be present in the resin that enters the compounding facility at less than 100 ppm. Therefore, while there is insufficient information available for quantifying air concentrations and dermal exposure estimates for *o*-dichlorobenzene, exposures are expected to be lower than they would be for *p*-dichlorobenzene, for which not a single measurement was detected above the LOD (LOD 0.026 ppm for workers and ranged from 0.0041–0.03 ppm for ONUs). EPA applied exposure estimates for *p*-dichlorobenzene by assessing the maximum LOD as the high-end exposure and half the maximum LOD as the central tendency exposure concentrations for each SEG, according to *Guidelines for Statistical Analysis of Occupational Exposure Data* (accessed August 5, 2026). Even with these health-protective assumptions, the *Draft Risk Evaluation for p-Dichlorobenzene* did not identify indication of unreasonable risk to *p*-dichlorobenzene from plastic compounding or plastic converting of *p*-dichlorobenzene. Therefore, EPA has determined that exposures from plastic compounding and converting of *o*-dichlorobenzene are negligible and human health risks are unlikely.

Functional Fluids (Closed System)

This OES covers COUs covered under Functional Fluids (Closed System) OES (*i.e.*, Industrial Use: Functional fluids (closed system): All other basic organic chemical manufacturing). For this OES, both inhalation and dermal routes of exposure result in risk estimates below the benchmark for workers, although inhalation risks for ONUs are above the benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

Handling *o*-dichlorobenzene used industrially as a functional fluid (*e.g.*, a heat transfer fluid) during equipment maintenance involve similar liquid-handling operations as *o*-dichlorobenzene is handled during repackaging operations. Crucial steps include loading, unloading, temporary storage, transferring fluids through hoses and containers, draining residual materials, and cleaning equipment and vessels. In both COUs, potential releases may occur during transfer operations, equipment cleaning, spills, leaks, and hose connection or disconnection activities. Therefore, these COUs present comparable release and worker exposure scenarios associated with liquid transfer and maintenance operations.

The high-end and central tendency worker inhalation exposure estimates for these OES are based on test order inhalation data from SABIC Innovative Plastics. The test order data included a total of 28 8-hour personal air samples taken between April and May of 2024, along with 2 occupational task-based personal air samples. Of these data, 15 8-hour samples and both task-based samples had associated task descriptions containing “Connect/disconnect transfer hoses to intermodal containers.” These data points were deemed by EPA to be relevant to activities associated with the use of functional fluids and included under this OES (SABIC, 2024). The TWA data were split between two SEGs: Average Adult Workers and ONUs. For 8-hour TWA concentrations for Average Adult Workers, the SABIC data contained 15 samples, 1 of which was below the LOD, with sample durations ranging from 397 to 458 minutes. For the ND sample, EPA used the substitution method with the LOD divided by 2. For this subset of data, the median and 95th percentile were used to represent a central tendency and high-end estimate, respectively. The high-end inhalation exposures is only relevant for acute exposure since operations for this OES are only conducted during maintenance which occurs on a need basis (every 3–5 years). There was a single ONU sample mapped to this OES, which was a detection of *o*-dichlorobenzene. Because of this, EPA presented the single exposure value instead of a high-end and a central tendency concentration (SABIC, 2024). See Section 4.1.1.1 to see more details on how number of samples and non-detects are accounted for in each dataset.

There is uncertainty as the monitoring data are not from functional fluid use but rather from workers performing tasks similar to those expected to take place at sites using functional fluids, such as connecting and disconnecting transfer hoses from containers. EPA also assumed between 6 and 12 exposure days per year; it is uncertain whether this captures actual worker schedules and exposures.

The Agency estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.04 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene in functional fluids as 75% per company correspondence (U.S. EPA, 2026ai). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. The high-end dermal exposure is only relevant for acute exposure since operations for this OES are only conducted during maintenance which occurs on a need basis (according to 1 industry source, every 3–5 years; EPA-HQ-OPPT-2018-0446-0037). Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Functional Fluids (Closed System) OES, both central tendency and high-end estimates are expected to be reflective of the range for worker inhalation exposures since the data are actual monitoring data and there is potential for a worker to be exposed to the entire range of exposures.

Industrial Use of Solvents

This OES covers COUs covered under Industrial Use of Solvent OES (*i.e.*, Industrial Use: Non-incorporative activities: Processing aids, not otherwise listed). For this OES, both inhalation and dermal routes of exposure result in risk estimates below benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

The high-end and central tendency worker inhalation exposure estimates for these OES are based on test order inhalation data from SABIC Innovative Plastics. The test order data included a total of 28 8-hour personal air samples taken between April and May of 2024, along with two occupational task-based personal air samples (SABIC, 2024). The TWA data were split between four SEGs: Polymer Chemical Operators, Copolymer Chemical Operators, Maintenance Mechanics/Electricians, and ONUs. For 8-hour TWA concentrations for Polymer Chemical Operators, the SABIC data contained nine samples, and zero non-detects. For Copolymer Chemical Operators, the SABIC data contained six samples, one of which was below the LOD. For Maintenance Mechanics/Electricians, the SABIC data contained seven samples, two of which were below the limit of detection. There were six ONU samples mapped to this OES, one was non-detect for *o*-dichlorobenzene. The substitution method using the LOD divided by two was used to account for all non-detects due to the standard deviation of the dataset (see Section 4.1.1.1 to see more details on how number of samples and non-detects are accounted for in each dataset). The medians and 95th percentiles were calculated to represent central tendency and high-end estimates, respectively, for each SEG (SABIC, 2024). There is uncertainty as the monitoring data are not from industrial use of solvents use but rather from workers performing tasks similar to those expected to take place at sites using industrial use of solvent, such as connecting and disconnecting transfer hoses from containers. EPA also assumed 250 exposure days/year for 8-hour shifts based on a typical worker schedule; it is uncertain whether this captures actual worker schedules and exposures.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.04 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene in industrial solvents as 100% per company correspondence (U.S. EPA, 2026ai). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical, and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Industrial Use of Solvent OES, both central tendency and high-end estimates are expected to be reflective of the range for worker inhalation exposures since the data are actual monitoring data and there is potential for a worker to be exposed to the entire range of exposures.

Use of Ink, Toner, and Colorant Products

This OES covers COUs covered under Use of Ink, Toner, and Colorant Products OES (*i.e.*, Commercial Use: Ink, toner, and colorant products: Ink and toners). For this OES, the inhalation route of exposure results in risk estimates below benchmark, though inhalation risks for ONUs are above benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

The high-end and central tendency worker inhalation exposure estimates for these OES are based on occupational inhalation data for *o*-dichlorobenzene during use of ink, toner, and colorant products in OSHA's CEHD database (OSHA, 2019). EPA estimated inhalation exposures using 23 partial-shift PBZ samples (22 non-detect) that equated to 4 full-shift TWA samples (total sample durations 378–447 minutes). Samples were taken in May 1992 from one site. Because 22 out of 23 samples were non-detects, EPA used a substitution method to quantify the 22 non-detects, substituting each non-detect value with its LOD divided by the square route of two, according to *Guidelines for Statistical Analysis of Occupational Exposure Data*. In absence of data specific to ONU exposure, EPA assumed that worker central tendency exposure was representative of ONU exposures. Almost all the inhalation data being non-detects, adds uncertainty to the exposure and risk estimates. To assist in addressing this uncertainty, EPA has conducted a sensitivity analysis for this OES to explore the impacts of the non-detect assumptions. This analysis can be found in Appendix H.

Also, there is uncertainty as to whether the measured concentrations and exposure frequencies from the single industry source accurately represent the entire industry and the true distribution of inhalation concentrations in this scenario. EPA also assumed 8 exposure hours per day and 250 exposure days per year based on continuous exposure during each working day for a typical worker schedule; it is uncertain whether this captures actual worker schedules and exposures.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.02 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene in inks, toners, and colorant products as a triangular distribution between 1 and 30% with a mode of 14.4% based on 2020 CDR and one SDS identified in the Use Report (U.S. EPA, 2020a; David Gray & Co. Pty Limited, 2004). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Ink, Toner, and Colorant Products OES, the monitoring data are worker exposure data collected from an actual facility. However, as explained above, because almost all data were non-detects, EPA assessed the maximum LOD and half the maximum LOD as the high-end and central tendency respectively. Consequently, the inhalation exposure estimates for high-end are upper-bound estimates and therefore, the central tendency estimates are expected to be reflective of the range for worker inhalation exposures. The current estimates are based on datasets that have a high number of non-detect data, which increases uncertainty particularly for the central tendency estimates, which required assumptions to quantify the many data points that were below the LOD. High-end estimates have less uncertainty due to the non-detects because they are more aligned with the higher observed exposures values.

Use of Paints and Coatings

This OES covers COUs covered under Use of Paints and Coatings OES (*i.e.*, Commercial Use: Paints and coatings: Coatings and paints, thinners, paint removers). Note that this is one of three OESs that covers this COU, the other two being Use of Paint Thinners and Removers and Sheep Branding Fluid, which are discussed later in this section. For this OES, the inhalation route of exposure results in risk estimates below benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

The high-end and central tendency worker inhalation exposure estimates for these OES are based on the *Automotive Refinishing Spray Coating Mist Inhalation Model*, which estimates worker inhalation exposure based on the concentration of the chemical of interest in the nonvolatile portion of the sprayed product and the concentration of over sprayed mist/particles (OECD, 2011a). The model is based on PBZ monitoring data for mists during automotive refinishing and reflects a variety of industrial and commercial automotive refinishing scenarios (*e.g.*, different gun types and booth configurations). EPA used the 50th and 95th percentile mist concentration from the model along with the concentration of *o*-dichlorobenzene in the paint (a median of 10% for central tendency and a maximum of 50% for high-end, based on the identified products and sources identified during systematic review) to estimate the central tendency and high-end inhalation exposures, respectively. In absence of data specific to ONU exposure, EPA assumed that worker central tendency exposure was representative of ONU exposures. Although most worker exposures to *o*-dichlorobenzene through spray application of paints and coatings are expected to be closer to the central tendency exposure values, a confluence of a subset of variables (*e.g.,* low ventilation, high-pressure spray, etc.) could result in elevated exposures. While most workers are not expected to experience these conditions regularly, they are considered plausible and expected for an acute 1-day exposure. Also, there is uncertainty as to whether the modeled air concentrations accurately represent the entire industry and the true distribution of inhalation concentrations in this scenario. EPA also assumed 8 exposure hours per day and 250 exposure days per year based on continuous exposure during each working day for a typical worker schedule; it is uncertain whether this captures actual worker schedules and exposures.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. The Agency modeled dermal exposure using a fraction absorbed value of 0.02 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene in paints and coatings as a triangular distribution between 0.25 and 50% with a mode of 10% based on 2020 CDR and multiple SDSs identified in the Use Report as well as preliminary review of the 2024 CDR data (U.S. EPA, 2020a, e). The Agency used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. ONUs were included in the dermal assessment for *o*-dichlorobenzene because employees who do not directly handle the chemical may come into contact with mist that has settled on surfaces in the process area. The input assumptions for the ONU assessment is the same as for the worker assessment, except the surface area of exposed skin is assumed to be a static value of 268 cm^2 (equivalent to the surface area of 1 palm). The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Use of Paints and Coatings OES, both the central tendency and high-end are expected to be reflective of the range for worker inhalation exposures for acute exposures although most workers are not expected to experience high-end exposures on a daily basis.

Use of Paint Thinners and Removers

This OES covers COUs covered under Use of Paint Thinners and Removers OES (*i.e.*, Commercial Use: Paints and coatings: Coatings and paints, thinners, paint removers). Note that this is one of three OESs that covers this COU, the other two being Use of Paints and Coatings (discussed above), and Sheep Branding Fluid (discussed later in this section). For this OES, neither inhalation nor dermal routes result in MOEs below benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

The high-end and central tendency worker inhalation exposure estimates for these OESs are based on data from one source that were identified during systematic review of literature. The source evaluated was the "Health Hazard Report – Metro Bus Maintenance Shop, Washington D.C.", which was prepared by NIOSH (NIOSH, 1981). EPA assumes that inhalation exposures from the application of paint strippers and degreasers as a part of bus maintenance are comparable to exposures resulting from the application of paint strippers during aviation maintenance. Results from this study were below the limit of detection of *o*-dichlorobenzene. The reported LOD for the NIOSH report was 0.005 ppm. EPA used this 8-hour TWA value to estimate inhalation exposures for this OES. EPA then calculated a central tendency value of 0.0025 ppm equivalent to half of the LOD for the sample; the high-end was equivalent to the limit of detection reported by the study. All the inhalation data being non-detects adds uncertainty to the exposure but there is high confidence that the occupational exposure estimates are upper bound. Also, there is uncertainty as to whether the measured concentrations and exposure frequencies from the single source accurately represent the entire industry and the true distribution of inhalation concentrations in this scenario—particularly due to the age of the source which means that it may not reflect current industry practices. EPA also assumed 8 exposure hours per day and 250 exposure days per year based on continuous exposure during each working day for a typical worker schedule; it is uncertain whether this captures actual worker schedules and exposures.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. The Agency modeled dermal exposure using a fraction absorbed value of 0.02 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene in paint thinners and removers as a uniform distribution between 1 and 30% based on 2016 CDR and multiple SDSs identified in the Use Report (U.S. EPA, 2020e, 2016). The Agency used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Use of Paint Thinners and Removers OES, the monitoring data are worker exposure data collected from an actual facility. However, as explained above, since the data was non-detect, EPA assessed the maximum LOD and half the maximum LOD as the high-end and central tendency respectively. Consequently, the inhalation exposure estimate is an upper-bound estimate and therefore, the central tendency estimates are expected to be reflective of the range for worker inhalation exposures.

Use in Solid Air Care Products

This OES covers COUs covered under the Use in Solid Air Care Products OES (*i.e.*, Commercial Use: Air Care Products: Continuous action air fresheners). For this OES, neither inhalation nor dermal routes result in MOEs below benchmark. The MOE values for this OES for different populations, exposure routes, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES.

For the Use in Solid Air Care Products OES, IECCU Version 1.1 (U.S. EPA, 2019b) was selected to model worker inhalation exposures to *o*-dichlorobenzene for the use of the toilet bowl deodorizer products. IECCU uses the single exponential decay model. As a conservative assumption, EPA selected to model a worker whose job is to clean a single bathroom during an entire 8-hour shift, such as at a large venue. Due to the availability of bathroom statistics at airports (number of toilets per concourse), EPA selected an airport as the venue and created a low- and high- exposure intensity scenario based on assumptions for a mid- and large-size airport. As national level statistics on airport building characteristics are not available, EPA developed inputs based on a concourse from a sample mid-size airport (Raleigh-Durham International – Terminal 2) for the low exposure scenario and a sample large size airport (Denver International) for the high exposure scenario. More information and details on the model can be found in Section 8.2.10.3 in the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). The outputs to this model are the acute and chronic exposures.

EPA obtained the occupational dermal exposure estimates by using the same permeability equation described in Section 7.1.5.2 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). The same equation was used for both consumer and occupational. The inputs are the same also, except for frequency of events. For the commercial acute scenario, the frequency of events is 100 (20 toilets × 5 bathrooms × 1 day) and for chronic is 1,200 (20 toilets × 5 bathrooms × 12 months) times a year. This scenario is further described in the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). Calculations were made for workers aged 21 years and older.

For the Use in Solid Air Care Products OES, the acute and chronic exposures are estimated from the model and are expected to be reflective of worker inhalation exposures for this OES.

Sheep Branding Fluid

This OES covers COUs covered under Sheep Branding Fluid OES (*i.e.*, Commercial Use: Paints and Coatings: Coatings and paints, thinners, paint removers). Note that this is one of three OESs that covers this COU, the other two being Use of Paints and Coatings, and Use of Paint Thinners and Removers, which are discussed earlier in this section. For this OES, neither inhalation nor dermal routes result in MOEs below benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

CEM Version 3.2 (U.S. EPA, 2023a) was used to evaluate occupational exposure based on the available data. Although CEM is intended for consumer uses, occupational exposure can be modeled by adjusting inputs specific for a worker scenario. The model was generated to reflect specific use conditions as well as physical and chemical properties of the fluid. The emissions model was selected based upon physical and chemical properties of the product and application use method for products. More information and details on the model can be found in Section 8.2.18 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA did not identify information on the amount of product used and therefore used professional judgement to estimate the amount. The Agency assumed that when using the applicator it would not take long for the user to apply the product. EPA identified that 69.5% of farms have 25 or less sheep and would manually use the paint to mark the sheep (Thorne et al., 2021). For farms with more sheep, the Agency assumed that another individual would mark the sheep, or a machine would be used. Therefore, EPA estimated that given the container size of 1.06 gallons, only 100 mL of paint is needed for 25 sheep. This was multiplied by the density of the paint (1.09 g/cm^3) to equate to 109 g per use for both acute and chronic. The EFH (U.S. EPA, 2011a) was consulted to obtain duration of uses for acute and chronic exposures for commercial use of sheep branding fluid. The primary limitation of the data is that multiple inputs were obtained from model defaults, rather than from information that is specific to the chemical or actual worker conditions.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.02 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene as a uniform distribution of 10 to 30% based on an SDS identified during systematic review (Heiniger Australia Pty Ltd, 2016). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

As a comparison to the Monte Carlo method, EPA also measured dermal exposures using the same consumer methods, using fractional absorption for sheep branding fluid. The acute scenario assumes accidental splashing four events a day, with contact area of 10% of the hand. The acute dose was 1.5×10^{-3} mg/kg/day with an MOE of 7.2×10^{3}. The chronic dose is 5.4×10^{-5} mg/kg/day, assuming 52 events/year and 10% hand contact as well. Similar to the Monte Carlo method, EPA did not find risk to commercial workers for this OES. For more information, see the *Draft Commercial Inhalation and Dermal Exposure Risk Calculator for o-Dichlorobenzene* (U.S. EPA, 2026h).

For the Sheep Branding Fluid OES, the acute and chronic exposures are estimated from the model and are expected to be reflective of worker inhalation exposures for this OES.

Use of Lubricants and Greases

This OES covers COUs covered under Use of Lubricants and Greases OES (*i.e.*, Commercial Use: Lubricants and greases: Lubricants and greases). For this OES, the inhalation route of exposure results in risk estimates below benchmark, although inhalation risks for ONUs are above benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

The high-end and central tendency worker inhalation exposure estimates for these OES were estimated using the 2020 *ESD on Chemical Additives in Automotive Lubricants* and Monte Carlo modeling (OECD, 2020). EPA used vapor generation rate and exposure duration parameters from the 1991 CEB Manual (CEB, 1991) and the *EPA Mass Balance Inhalation Model* to model the exposure points described in the ESD, particularly for the unloading and cleaning of containers. The *EPA Mass Balance Inhalation Model* estimates the concentration of the chemical in the breathing zone of the worker based on a vapor generation rate (G) for each activity. The Agency assumes that a worker can perform each of these activities during a work-shift (EPA assumed an 8-hour work-shift). The Agency estimated the TWA inhalation exposure for a full 8-hour work-shift as an output of the Monte Carlo simulation by: (1) assuming the time-weighted inhalation exposures for each of the exposure points; and (2) assuming *o*-dichlorobenzene exposures were zero outside these activities. Appendix N.2 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) describes model equations and other input parameters used in the Monte Carlo simulation to model worker exposures for the Use of Lubricants and Greases OES. The high-end values represent the 95th percentile and the central tendency values represent the 50th percentile of the simulation outputs.

In absence of data specific to ONU exposure, EPA assumed that worker central tendency exposure was representative of ONU exposures. There is uncertainty as to whether the modeled air concentrations accurately represent the entire industry and the true distribution of inhalation concentrations in this scenario. EPA also assumed 8 exposure hours per day and 253 exposure days per year based on continuous exposure during each working day for a typical worker schedule; it is uncertain whether this captures actual worker schedules and exposures.

The Agency estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.02 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). The Agency assessed the concentration of *o*-dichlorobenzene in lubricants as a triangular distribution with a minimum value of 0.1%, a maximum value of 5%, and a mode of 1% based on multiple SDSs identified in the Use Report (U.S. EPA, 2020e). The mode represents the mode of endpoints reported in the SDSs. EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Use of Lubricants and Greases OES, the central tendency values of exposure estimates are expected to be most reflective of worker inhalation exposures to reasonably expected conditions and the high-end values of exposure estimates are expected to be most reflective of workers exposed to potentially elevated (*e.g.,* due to low ventilation, high concentration, high use rate) inhalation exposures.

Use of Fuels and Related Products

This OES covers COUs covered under Use of Fuels and Related Products OES (*i.e.*, Commercial Use: Fuels and related products: Fuel additive). For this OES, neither inhalation nor dermal routes result in MOEs below benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

The high-end and central tendency worker inhalation exposure estimates for these OES were estimated using the *Use of Chemicals in Fuels and Related Products Generic Scenario* (U.S. EPA, 2021b). The GS evaluates inhalation exposures to fuel additives using inhalation monitoring of volatile organic compounds (VOCs) collected during transfer of gasoline from transport containers and storage tanks and correcting for mole fraction and vapor pressure of the chemical of interest (*i.e.*, *o*-dichlorobenzene) in the vapor phase of gasoline. To do this, EPA used the "NCS Vapor Fraction Tables" presented in the GS, which requires the inputs of *o*-dichlorobenzene's molecular weight and weight fraction in the liquid fuel to estimate a mole fraction in the vapor. Based on the available SDSs, EPA expects *o*-dichlorobenzene to be used as a partial replacement for normal two-cycle engine oil at a ratio of one part *o*-dichlorobenzene-containing oil to three parts standard oil (EPA-HQ-OPPT-2018-0444-0026). Per similar products identified via internet search, engine oils are typically used in a ratio of 1 part oil to 50 parts gasoline. Using the SDSs' concentration range of 0.1 to 1% *o*-dichlorobenzene, the total weight fraction of *o*-dichlorobenzene in the liquid phase is 5.9×10^{-4} to 4.9×10^{-3} weight percent. This resulted in a high-end vapor fraction of 4.8×10^{-8}% and central tendency vapor fraction of 4.0×10^{-7}%. These values were then multiplied by the total hydrocarbon exposure values of 170 ppm (high-end) and 66.1 ppm (central tendency) (U.S. EPA, 2021b) to estimate the *o*-dichlorobenzene 8-hour TWA exposure concentrations. EPA assumed that worker central tendency exposure was representative of ONU exposures. There is uncertainty as to whether the modeled air concentrations accurately represent the entire industry and the true distribution of inhalation concentrations in this scenario. EPA also assumed 8 exposure hours per day and 250 exposure days per year based on continuous exposure during each working day for a typical worker schedule; it is uncertain whether this captures actual worker schedules and exposures.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.02 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene in fuels as a uniform distribution between 0.1 and 0.5% based on multiple SDSs identified in the Use Report (U.S. EPA, 2020e). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Use of Fuels and Related Products OES, the central tendency values of exposure estimates are expected to be most reflective of worker inhalation exposures to reasonably expected conditions and the high-end values of exposure estimates are expected to be most reflective of workers exposed to potentially elevated (*e.g.,* high concentration of VOCs in the breathing zone, high concentration of *o*-dichlorobenzene) inhalation exposures.

Use of Laboratory Chemicals

This OES covers COUs covered under Use of Laboratory Chemicals OES (*i.e.*, Commercial Use: Other use: Laboratory chemicals; cleaning and furnishing care products). Note that this is one of three OESs that covers this COU, the other two being Use of Cleaning and Furnishing Care Products, and Use of Other Cleaning Products, both discussed later in this section. For this OES, the dermal route of exposure results in risk estimates below benchmark at high-end exposures, but dermal central tendency and inhalation routes result in MOEs above benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES.

EPA estimated inhalation exposure to this OES using two surrogates with data from laboratory technicians in quality control laboratories within manufacturing or processing facilities. The first surrogate came from occupational inhalation monitoring data for *p*-dichlorobenzene during processing as a reactant provided via a data submission from the ACC Consortium (ACC, 2023). This dataset came from two processing facilities, and contained an SEG for Lab Technicians. All nine Lab Technician (assessed as both 8- and 12-hour TWAs) datapoints were reported non-detects for *p*-dichlorobenzene (LOD 0.0041–0.057 ppm) in the ACC Consortium data. In this surrogate estimate, EPA used the maximum LOD (0.057) as the assumed high-end of exposure and half the LOD as the central tendency. This method, despite being all non-detects, resulted in MOEs below the benchmark MOE. All the inhalation data being non-detects adds uncertainty to the exposure but there is high confidence that the occupational exposure estimates are upper bound.

Because of the lack of detected samples, EPA also estimated exposure from this OES using surrogate monitoring data from 1,1,2-trichloroethane (Labcorp Early Development, 2023). Although this chemical is not as favorable a surrogate option as *p*-dichlorobenzene, the dataset included detected monitoring data. EPA was provided this exposure data from the Vinyl Institute in response to a test order. The data included a worker job title of "Laboratory Technician," which EPA determined as relevant to this OES. In total, the data provided by the Vinyl Institute included 29 full-shift worker PBZ air samples along with 23 short-term samples taken between July and October 2023. Vinyl Institute data for Laboratory Technicians included both 8- and 12-hour TWAs, and both results are presented in this assessment. For 8-hour TWA concentrations for Laboratory Technicians, the Vinyl Institute data contained seven samples, and two of which were below the LOD. For 12-hour TWA concentrations for Laboratory Technicians, the Vinyl Institute data contained 22 samples, 8 of which were below the LOD. All non-detect samples were estimated as the LOD/2 due to the standard deviation of the datasets (see Section 4.1.1.1). For this subset of data, the median and 95th percentile were used to represent a central tendency and high-end estimate, respectively.

In absence of data specific to ONU exposure from either surrogate source, the Agency assumed that worker central tendency exposure was representative of ONU exposure and used that to generate estimates for ONUs.

All exposure values were then corrected based on differences in vapor pressure to estimate exposure estimates for *o*-dichlorobenzene (CEB, 1991). The use of surrogate monitoring data from another chemical adds uncertainty to the exposure and risk estimates, as well as the data being from a laboratory at a chemical manufacturing or processing facility rather than a commercial laboratory. Also, there is uncertainty as to whether the measured concentrations and exposure frequencies from a few industry sources accurately represent the entire industry and the true distribution of inhalation concentrations in this scenario.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. The Agency modeled dermal exposure using a fraction absorbed value of between 0.02 and 0.04 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-dichlorobenzene in laboratory chemicals as a uniform distribution with a lower bound of 0.002% and an upper bound of 100%. based on compiled SDS information for liquid lab chemical products containing *o*-dichlorobenzene. The lower and upper bounds represent the minimum and maximum reported concentrations in the SDSs (U.S. EPA, 2020e). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Use of Laboratory Chemicals OES, both central tendency and high-end estimates are expected to be reflective of the range for worker inhalation exposures since the data are actual monitoring data and there is potential for a worker to be exposed to the entire range of exposures.

Use of Cleaning and Furnishing Care Products

This OES covers COUs covered under Use of Cleaning and Furnishing Care Products OES (*i.e.*, Commercial Use: Other use: Laboratory Use; cleaning and furnishing care products). Note that this is one of three OESs that covers this COU, the other two being Use of Laboratory Chemicals (discussed above) and Use of Other Cleaning Products (discussed later in this section). For this OES, the inhalation route of exposure results in risk estimates below benchmark, although inhalation risks for ONUs are above benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

EPA identified occupational inhalation data for *o*-dichlorobenzene during use of cleaning and furnishing care products in OSHA's CEHD database (OSHA, 2019) based on relevant SIC codes. EPA estimated inhalation exposures using two PBZ samples taken in March 1995 from one site under the SIC code 7216 – Drycleaning Plants, Except Rug Cleaning. These two samples were from the same facility, date, and shared the same sample number in the CEHD database, and thus they were assumed to be two halves of a single full-shift sample. As EPA estimated inhalation exposures using this one PBZ sample, EPA was unable to estimate a range of potential exposures during this scenario and presents only this one concentration. A primary limitation of this data in capturing the true distribution of inhalation concentrations for this OES is that the dataset is only comprised of one sample from one facility. Also, the samples were taken in 1995 and may not be reflective of current operations. These limitations reduce confidence in the assessment. EPA also did not generate estimates of ONU exposure; however, EPA assumes that ONU exposures would be equal to or less than estimated worker exposures.

Since only one data point was found relevant to this OES, EPA also used surrogate data to estimate exposure using information from a generic scenario, *Chemicals Used in Furnishing Cleaning Products* (U.S. EPA, 2022). This generic scenario presents monitoring data from a study that measured air concentration of volatile hydrocarbon substances during the use of various general cleaning products. The tested products were used in a chamber designed to simulate a typical residential environment, and then air concentrations were measured over 24 hours. Since EPA does not know the specific scenario that an *o*-dichlorobenzene product would be used in, the 50th and 95th percentile exposures from all the scenarios were used to estimate the central tendency and high-end exposure respectively. The central tendency of the volatile organic samples from different cleaning scenarios closely aligns with the single sample from the dry-cleaning industry (0.17 ppm 8-hour TWA from the surrogate data, compared to 0.15 ppm from the dry-cleaning industry), bolstering confidence in this exposure estimate. The high-end exposure obtained using the surrogate data from the generic scenario is an order of magnitude higher than the central tendency results (1.6 ppm 8-hour TWA).

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.02 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the *o*-dichlorobenzene concentration in cleaning and furnishing care products as a triangular distribution between 0.1 and 5% with a mode of 1% based on multiple SDSs identified in the Use Report (U.S. EPA, 2020e). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Use of Cleaning and Furnishing Care Products OES, the monitoring data used in the assessment are PBZ and directly applicable to the use. Surrogate data from a generic scenario also supported the monitoring data used in this assessment. However, as explained above, there is only one chemical-specific full-shift sample taken in 1995, which may not be reflective of all use patterns—particularly those occuring in the present day. Also, this assessment assumes that *o*-dichlorobenzene is used as a spot cleaner within dry cleaning facilities due to the SIC code of the OSHA CEHD data that indicates the facility conduct dry cleaning (OSHA, 2019), as well as indication from systematic review that *o*-dichlorobenzene is utilized by dry cleaning plants (OECD, 2001a) and used as a component in cleaning and washing agents, as recently as 2012 (SPIN, 2020). EPA did not find more specific information about cleaning tasks performed with substances containing *o*-dichlorobenzene.

Use of Other Cleaning Products

This OES covers COUs covered under Use of Other Cleaning Products OES (*i.e.*, Commercial Use: Other use: cleaning and furnishing care products). Note that this is one of three OESs that covers this COU, the other two being Use of Laboratory Chemicals, and Use of Cleaning and Furnishing Care Products, both discussed earlier in this section. For this OES, both inhalation and dermal routes of exposure result in risk estimates below benchmark. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

CEM Version 3.2 (U.S. EPA, 2023a) was used to evaluate occupational exposure based on the available data. Although CEM is intended for consumer uses, occupational exposure can be modeled by adjusting inputs specific for a worker scenario. The model was generated to reflect specific use conditions as well as physical and chemical properties of the fluid. The drain and toilet cleaners scenario was used, where the "emission from product added to water" model was selected based upon the intended use of the product. The specific physical and chemical properties of the product and application use method for products were used as inputs into the model and is further described below.

More information and details on the model can be found in Section 4.1.1.1. Inputs into the model include amount of product use, duration, and frequency of use. For the amount of product used, EPA used 450 mL (582 g) per use for both central tendency and high-end calculations, based on the recommended cleansing dose of a commercially available plumbing line cleaner/deodorizer containing *o*-dichlorobenzene (Robertson, 1994). EPA did not identify any information on the duration of use, therefore 5 minutes was assumed. For frequency of use, the Agency assumed for a low-end scenario that the product is used once per working day and for high-end the Agency also assumed that the product is used 8 times per working day (assuming a worker may visit 1 home per hour over an 8-hour workday, and conduct this use once per home). A total of 250 workdays per year is assumed. The room volume used was 15 m^3 based on CEM defaults of the size of a bathroom.

The primary limitation of the inhalation assessment is the lack of current information about the model inputs, such as the amount of product used which is from a 1994 publication. There is also uncertainty regarding the duration of use, as EPA did not identify information on how long it takes for a worker to use a septic tank cleaner. Assuming a bathroom volume of 15 m^3 and a use frequency of once per day (for central tendency) to 8 times per day (for high-end) may also over or underestimate exposures depending on the actual frequency of this task and the actual sizes of the bathrooms in which this work is performed.

EPA estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. The Agency modeled dermal exposure using a fraction absorbed value of 0.04 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-dichlorobenzene* (U.S. EPA, 2026f). EPA assessed the concentration of *o*-

dichlorobenzene as a uniform distribution with a minimum of 74% and a maximum of 99% based on literature identified during systematic review (Utility Wonder Products, 2014; Robertson, 1994). The Agency used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

As a comparison to the Monte Carlo method, EPA also measured dermal exposures using the same consumer methods, using fractional absorption for septic tank cleaner. The acute scenario assumes accidental splashing eight events a day, with contact area of 10% of the hand and 0.99 weight fraction. The acute dose was 5.0×10^{-2} mg/kg/day with an MOE of 2.2×10^{2}. The chronic dose is 3.4×10^{-2} mg/kg/day, assuming 2000 events/year (8 times a day for 240 workdays) and 10% hand contact as well. Similar to the Monte Carlo method, EPA did not find risk to commercial workers for this OES. For more information, see the *Draft Commercial Inhalation and Dermal Exposure Risk Calculator for o-Dichlorobenzene* (U.S. EPA, 2026h).

For this OES, the acute and chronic exposures are estimated from the model and are expected to be reflective of worker inhalation exposures for this OES.

Disposal

This OES covers COUs covered under the Disposal OES (*i.e.*, Disposal: Disposal: Disposal). For this OES, the inhalation route of exposure results in risk estimates below benchmark for high-end exposures for both workers and ONUs. The MOE values for this OES for different population, exposure route, and health endpoints can be found in Table 4-13, which also includes information about PPE needed to mitigate risk for each OES. Table 4-14 contains the known PPE information for each OES.

The high-end and central tendency worker inhalation exposure estimates for these OES are based on surrogate monitoring data from *p*-dichlorobenzene because the two isomers have similar structure (identical molecular weights and chemical formulas), and physical and chemical properties (*e.g.*, both with a vapor pressure of ≈1 mm Hg). Also, Westlake indicated that both chemicals are generated together as byproducts during VCM production, handled through the same pretreatment and waste treatment equipment (incineration), and are present in small, similar amounts, with *o*-dichlorobenzene expected at lower concentrations. Therefore, both are expected to behave similarly during disposal and incineration, supporting the use of *p*-dichlorobenzene data as a surrogate for *o*-dichlorobenzene exposure estimation. The monitoring data was from Westlake Corporation collected at one facility. EPA identified 13 workers and 6 ONU occupational full-shift PBZ samples from the Westlake dataset to estimate inhalation exposures for this OES. The samples were collected from waste treatment operators (workers) and waste treatment supervisors (ONUs).

All inhalation data sampled were reported as non-detects (ND) with the LOD concentrations corrected to account for *o*-dichlorobenzene's differing vapor pressure ranging between 0.023 and 0.042 ppm. EPA assessed the maximum LOD and half the maximum LOD as the high-end and central tendency TWA exposure concentrations for each SEG respectively, according to *Guidelines for Statistical Analysis of Occupational Exposure Data* (ACC, 2023). The *p*-dichlorobenzene exposure estimates were corrected based on differences in vapor pressure to estimate exposure estimates for *o*-dichlorobenzene (CEB, 1991). All the inhalation data being non-detects adds uncertainty to the exposure, but there is high confidence that the occupational exposure estimates are upper bound. There is also uncertainty as to whether the measured concentrations and exposure frequencies from the single industry site accurately represents the entire industry and the true distribution of inhalation concentrations in this scenario. EPA assumed 250 exposure days/year for 8-hour shifts based on a typical worker schedule; it is uncertain whether this captures actual worker schedules and exposures.

The Agency estimated dermal exposures for this OES by performing a Monte Carlo simulation with 100,000 iterations and the Latin Hypercube sampling method using a fractional absorption. EPA modeled dermal exposure using a fraction absorbed value of 0.02 for *o*-dichlorobenzene and followed the processes discussed in Section 8.1.4 and Appendix M of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). The Agency assessed the concentration of *o*-dichlorobenzene as a uniform distribution with a minimum of 4% and a maximum of 6.4% based on literature identified during systematic review (Midwest Research Institute, 1984). EPA used a range for exposed skin surface area for average adult workers between 0 to 1,070 cm^2 (upper bound represents mean 2-hand surface area for adult males). The high-end exposures are the 95th percentiles of the respective simulation output, and the central tendency exposures are the 50th percentiles. Dermal exposures for ONUs are expected to be negligible for this OES and were not calculated because an ONU is not expected to directly handle the chemical, and airborne mist is not expected to be generated by this use. The primary limitation of the dermal assessment is the uncertainty in the representativeness of the input parameter values toward the true distribution of potential dermal exposures.

For the Disposal OES, the monitoring data are worker exposure data collected from an actual facility. However, as explained above, because all data were non-detects, EPA assessed the maximum LOD and half the maximum LOD as the high-end and central tendency, respectively. Consequently, the inhalation exposure estimates for high-end are upper-bound estimates and therefore, the central tendency estimates are expected to be reflective of worker inhalation exposures.

Distribution in Commerce

For purposes of assessment in this risk evaluation, distribution in commerce consists of the transportation associated with the moving of *o*-dichlorobenzene or *o*-dichlorobenzene-containing products and/or articles between sites manufacturing, processing, and use COUs, or the transportation of *o*-dichlorobenzene-containing wastes to recycling sites or for final disposal. EPA expects all the *o*-dichlorobenzene or *o*-dichlorobenzene-containing products and/or articles to be transported in closed system or otherwise to be transported in a form (*e.g.*, articles containing *o*-dichlorobenzene) such that there is negligible potential for releases except during an incident. Therefore, no occupational exposures are reasonably expected to occur, and no separate assessment was performed for estimating releases and exposures from Distribution in Commerce OES.

4.3.2.1.2 Occupational Risk Estimates and Impacts of Personal Protective Equipment (PPE)

Industry and other sources indicate that engineering controls and respiratory PPE vary by use and sometimes by task. While EPA does not have any information to suggest that respirators are worn for the entirety of the work day for any job group/SEG, EPA did find information relevant to some OESs about what exposure controls, including PPE, apply to certain job groups (see Table 4-14). The Agency has no evidence that respirators are worn for entire shifts in any job group/SEG, but for some OESs it identified which controls, including PPE, apply to specific groups. This information is summarized in Table 4-14. Because protection levels vary across tasks and days, a consistent level cannot be assumed. However, using protection during high-intensity tasks can substantially reduce full-shift exposure when those tasks drive most of the exposure.

Regarding dermal PPE, if gloves are worn by workers it may reduce dermal exposure. However, a quantitative protection factor cannot be assigned to different types of gloves and durability and chemical resistance varies among glove types. Dermal exposure can also occur on skin outside of the hands if arms and legs are not covered, or if a worker touches skin on another part of their body with a glove contaminated with the chemical. Improper glove application, removal, or tears in the glove may also cause dermal exposure despite the use of gloves.

Table 4-14. Summary of PPE by Occupational Exposure Scenario (OES)

OES	Known Exposure Controls (Including Personal Protective Equipment, PPE)
Repackaging	PPE documented in the SABIC test order data (SABIC, 2024): • Polymer/copolymer operators: hard hats, flame-resistant uniforms, chemical-resistant suits, rubber or safety-toe boots, neoprene gloves, safety glasses, and face shields. • Task-specific PPE may include leather gloves, hearing protection, and safety shoes. EPA found no data on whether this PPE applies at repackaging sites. • Indoor exposure controls: general ventilation plus task-specific local exhaust ventilation.
Processing as a Reactant	The report provided by ACC for surrogate *p*-dichlorobenzene described the following typical PPE for each SEG (Integral Consulting, 2024; Labcorp Early Development, 2023): • Material handlers: flame resistant clothing, chemical resistant jacket, safety glasses, face shield, steel toe shoes, gloves, hearing protection • Process field operators: flame resistant clothing, hard hat, safety glasses, steel toe shoes, gloves, face shield, and hearing protection. The process field operator, tasked with drumming out the process equipment, was reported to wear SCBA for respiratory protection • Lab technicians: flame resistant clothing, lab coat, safety glasses, steel toe shoes, gloves ACC reports that in general workers wear chemically resistant gloves with specific application training.
Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing	No engineering controls or documented PPE were available from the data (OSHA, 2019).
Incorporation into Formulation, Mixture, or Reaction Product	No engineering controls or documented PPE were available from the data (IARC, 1999; Dow Chemical, 1984).
Functional Fluids	PPE documented in the SABIC test order data (SABIC, 2024): • Polymer/copolymer operators: hard hats, flame-resistant uniforms, chemical-resistant suits, rubber or safety-toe boots, neoprene gloves, safety glasses, and face shields. • Task-specific PPE may include leather gloves, hearing protection, and safety shoes. This information is from a site that uses *o*-dichlorobenzene as an industrial solvent. While this may be applicable, EPA found no information on the PPE

OES	Known Exposure Controls (Including Personal Protective Equipment, PPE)
	used at sites using *o*-dichlorobenzene as a functional fluid.
Industrial Use of Solvent	PPE documented in the SABIC test order data (SABIC, 2024): • Polymer/copolymer operators: hard hats, flame-resistant uniforms, chemical-resistant suits, rubber or safety-toe boots, neoprene gloves, safety glasses, and face shields. • Task-specific PPE may include leather gloves, hearing protection, and safety shoes. • One SEG 4 operations engineer wore only "regular clothes." Indoor controls included general ventilation and task-specific local exhaust. PPE documented in the WeylChem test order data WeylChem, 2025: • Highest-exposure task workers: safety-toe shoes, full-body Tyvek suit, PVC gloves, and a full-face organic vapor cartridge respirator.
Use of Ink, Toner, and Colorant Products	No engineering controls or documented PPE were available from the data (OSHA, 2019).
Use of Paints and Coatings	EPA did not find information to the extent to which engineering controls and worker PPE are used at facilities that use *o*-dichlorobenzene-containing paints and coatings (OECD, 2011a).
Use of Paint Thinners and Removers	No engineering controls or documented PPE were available from the data (NIOSH, 1981).
Use of Lubricants and Greases	EPA did not find information to the extent to which engineering controls and worker PPE are used at facilities using *o*-dichlorobenzene in lubricant and greases (OECD, 2020).
Use of Fuels and Related Products	EPA did not find information to the extent to which engineering controls and worker PPE are used at sites using *o*-dichlorobenzene in fuels and related products (U.S. EPA, 2021b).
Use in Solid Air Care Products	No engineering controls or documented PPE were available from the data. However, the product manufacturer recommends the user wear protective gloves/clothing (Willert Home Products, 2019). Additionally, it is reasonably assumed that a worker regularly handling air care products in a commercial setting would be regularly wearing protective gloves based on the expected associated other tasks (*e.g.,* cleaning toilets and other surfaces).
Incorporation into Grinding Wheels	No engineering controls or documented PPE were available.
Use of Laboratory Chemical	The Vinyl Institute on surrogate 1,1,2-trichloroethane documented that engineering controls such as fume hoods and localized exhaust are present in laboratories. Laboratory technicians used PPE such as flame retardant coveralls, safety glasses, and nitrile gloves. Face shields are used during sample manipulation, and half-face organic respirators are worn when standards are weighed out. EPA did not identify data indicating whether similar PPE would be worn for *o*-dichlorobenzene use as a laboratory chemical (Labcorp Early Development, 2023).
Use of Cleaning and	No information on engineering controls or documented PPE was found (OSHA,

OES	Known Exposure Controls (Including Personal Protective Equipment, PPE)
Furnishing Care Products	2019).
Sheep Branding Fluid	No information on engineering controls or documented PPE was found.
Disposal	PPE documented at the Westlake Corporation facility (Exponent Inc., 2024): • Waste treatment operators: dermal PPE included nitrile gloves, glasses, face shields, boots, aprons, and fire-resistant (FR) clothing; no respiratory protection. • Engineering controls: general ventilation in the work area. • ONUs: most wore glasses and boots; one also wore nitrile gloves and FR clothing. This information is from a site that produces *o*-dichlorobenzene as a byproduct. While this PPE may be applicable, EPA found no information on the PPE used at other sites that are disposing of *o*-dichlorobenzene.

Occupational risk estimates are summarized in Table 4-13, including the APF that would be required to reduce exposures enough that risk estimates would no longer be below benchmarks (assuming correct and continuous respirator usage, or other engineering controls resulting in an equivalent reduction in exposure). When risks remain even at APF 50, a higher respiratory protection level (*e.g.*, 1,000, 10,000) is required, although these are highly unlikely to be used for a full-shift duration and are more appropriate for use in short-term tasks.

Risk estimates for all potential PPE options are presented in *Draft Risk Calculator for Occupational Exposures for o-Dichlorobenzene* (U.S. EPA, 2026ac). The appropriateness of any protection factor that demonstrates exposures resulting in a worker MOE above the benchmark MOE may require additional consideration. The presented protection factors simply represent a value by which corresponding PPE may increase the estimated worker MOE above the benchmark MOE. The practicality and feasibility of implementing any PPE corresponding to a protection factor is part of a larger evaluation of effective occupational control strategies.

4.3.3 Risk Estimates for Consumers

Table 4-15 summarizes the inhalation and Table 4-16 the dermal MOEs used to characterize non-cancer risk for acute exposure to *o*-dichlorobenzene. Acute exposure assessment for consumers considers high-intensity exposure scenarios (95th percentile inputs) risk estimates to assess exposures that would be expected to be on the high end of the expected exposure distribution. The benchmark MOE was 30 for non-cancer risk for both inhalation and dermal exposures for all durations. The main objective was to calculate exposure and risk estimates by COU and by products from inhalation. The inhalation HEC of 0.45 ppm and the dermal HED of 11 mg/kg-day are applied to acute exposures.

Toxicity does not accumulate from repeated exposures. Instead, respiratory toxicity and liver toxicity demonstrate the same or decreasing severity over time. In other words, the acute, single-day studies provide more sensitive or equally sensitive endpoints compared to repeat dosing studies in laboratory animals. As such, EPA has determined that evaluation of risks from a single day (*i.e.*, acute) exposure is protective for intermediate and chronic exposures and only acute risks are presented. Acute exposure estimates used high-end values (95th percentile) for product use frequency and duration of product use while chronic uses 50th percentile, so the absence of risk relative to benchmark following acute exposures further precludes the need to consider risk from potential chronic exposures for all but the one consumer scenario of the septic tank cleaner. Therefore, EPA is presenting only the acute MOEs in the risk characterization. Supplemental risk calculator files include exposure estimates for all durations based on traditional averaging time adjustments, in addition to scenarios expected for intermediate and chronic exposure durations (U.S. EPA, 2026j). As detailed in Sections 4.1.2 and 4.1.1.1, consumers may be exposed to the same scenario as workers using septic tank cleaners, using the product once a day. Therefore, EPA used the same inhalation and dermal exposure calculated from the commercial scenario for consumers and identified potential inhalation risk as when the acute MOE is below the benchmark of 30. The inhalation acute consumer MOE is lower than the commercial scenario for one use a day because the consumer scenario assumes that the user is staying in the home for the rest of the day while the worker leaves the home right after the work is completed. For the rest of the products and scenarios, because acute MOEs are above the benchmark for both inhalation and dermal exposures, (1) the MOEs are expected to be above the benchmark across all durations (including intermediate and chronic), and (2) there are no risks for consumer exposures for these scenarios. For details on the inputs and assumptions for both inhalation and dermal exposures, see Section 4.1.2, as well as Section 7 in the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f)

Table 4-15. Inhalation Consumer Risk Summary Table

Life Cycle Stage/ Category	Subcategory/ Consumer Condition of Use Scenario	Product	Acute Non-Cancer (Benchmark MOE = 30)
Air care products	Continuous action air fresheners (2 bathrooms)	Toilet bowl deodorizer	69
Lubricants and greases	Lubricants and greases	Marvel Mystery Oil[a]	1.8E03
		Marvel Air Tool	3.7E03
Paints and coatings	Thinners, Sheep-branding fluid	Sheep branding fluid	1.6E03
		Paint thinner (test order emission rate)	3.8E02
		Paint thinner (default emission rate)	76
Other use	Other use including ceramics glaze, and cleaning and furnishing care products	Ceramic glaze (test order emission rate)	3.4E03
		Ceramic glaze (default emission rate)	4.2E03
		Septic tank cleaners	**7.8E−02**

[a] The Marvel Mystery Oil falls under both Lubricants/greases and Fuel additive COUs. For the purpose of this assessment, the product was evaluated under lubricants/greases and would use the same inputs and assumptions as for fuel additives.

Table 4-16. Dermal Consumer Risk Summary Table

Life Cycle Stage/ Category	Subcategory/ Consumer Condition of Use Scenario	Product	Age Group (years)	Acute Non-Cancer (Benchmark MOE = 30)
Air care products	Continuous action air fresheners	Toilet bowl deodorizer	Adult (21+)	1.9E03
			Youth (16+20)	2.0E03
Lubricants and greases	Lubricants and greases	Marvel Mystery Oil [a]	Adult (21+)	1.2E09
			Youth (16–20)	1.2E09
		Marvel Air Tool	Adult (21+)	6.2E08
			Youth (16–20)	6.2E08

Life Cycle Stage/ Category	Subcategory/ Consumer Condition of Use Scenario	Product	Age Group (years)	Acute Non-Cancer (Benchmark MOE = 30)
Paints and coatings	Thinners, Sheep-branding fluid	Sheep branding fluid	Adult (21+)	6.6E05
			Youth (16–20)	6.6E05
		Paint thinner	Adult (21+)	1.4E07
			Youth (16–20)	1.4E07
			Youth (11–15)	1.3E07
Other use	Other use including ceramics glaze, and cleaning and furnishing care products	Ceramic glaze	Adult (21+)	1.3E07
			Youth (16–20)	1.3E07
			Youth (11–15)	1.2E07
		Septic tank cleaner	Adult (21+)	1.8E03
			Youth (16–20)	1.8E03

[a] The Marvel Mystery Oil falls under both lubricants/greases and fuel additive COUs. For the purpose of this assessment, the product was evaluated under lubricants/greases and would use the same inputs and assumptions as for fuel additives.

4.3.4 Risk Estimates for General Population

4.3.4.1 Ambient Air

Acute MOEs were calculated using an acute HEC of 0.45 ppm (2,700 μg/m^3). A benchmark of 30 was used for acute screening-level risk estimates. Toxicity does not accumulate from repeated exposures. Instead, respiratory toxicity and liver toxicity demonstrate the same or decreasing severity over time. In other words, the acute, single-day studies provide more sensitive or equally sensitive endpoints compared to repeat dosing studies in laboratory animals. As such, EPA has determined that evaluation of risks from a single day (*i.e.*, acute) exposure is protective for intermediate and chronic exposures and only acute risks are presented. Hazard values used to calculate screening-level risk estimates are described in the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w). MOEs were calculated at each distance (100, 100–1,000, and 1,000 m) using the 50th and 95th percentile IIOAC-modeled ambient air concentrations as conservative exposure estimates for each individual facility and for every reporting year. This is further detailed in Appendix I of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

All non-cancer screening-level risk estimates were above the non-cancer benchmark for acute exposures (Table 4-17). Therefore, it was not necessary to refine the conservative assumptions of the screening-level assessment. Exposure concentrations and acute non-cancer screening-level risk estimates based on IIOAC-modeled results are presented the supplemental file: *Draft Integrated Indoor Outdoor Air Calculator (IIOAC) TRI 2019-2023 Exposure and Risk Analysis for o-Dichlorobenzene* (U.S. EPA, 2026x).

Table 4-17. Acute Margin of Exposures Based on Highest IIOAC-Modeled Concentrations

COU			Occupational Exposure Scenario (OES)	Facility Count	MOE Based on Highest 50th Percentile Modeled Concentration Benchmark = 30			MOE Based on Highest 95th Percentile Modeled Concentration Benchmark = 30		
					Distance			Distance		
Life Cycle Stage	Category	Subcategory			100 m	100– 1,000 m	1,000 m	100 m	100– 1,000 m	1,000 m
Processing	Recycling	Recycling	Industrial Use of Solvents	4	1.1E02	9.6E02	6.7E07	1.0E02	8.6E02	2.1E03
Manufacturing	Manufacture	Domestic manufacture	Manufacturing	2	5.6E04	2.6E05	3.4E06	4.7E04	2.4E05	4.8E05
Manufacturing	Import	Import	Repackaging[7]	1	–	–	–	–	–	–
Processing	Repackaging	Repackaging								
Disposal	Disposal	Disposal	Waste Handling, Treatment, and Disposal	15	6.2E02	5.4E03	6.3E10	5.6E02	4.8E03	1.2E04
			Total	**22**						

[7] Facility assigned to OES – Repackaging, reported 0 lb of *o*-dichlorobenzene release to TRI. MOE calculated is undefined due to modeled exposure concentrations of 0.00 µg/m^3

4.3.4.2 Indoor Air

IIOAC also calculates a mean and high-end indoor air concentration based on the modeled outdoor/ambient air concentration using mean and high-end indoor-outdoor ratios. In IIOAC, indoor-outdoor ratios of 0.65 and 1 are used for the mean and high-end ratios, respectively (U.S. EPA, 2026f). As presented in Table 4-17, all non-cancer screening-level risk estimates were above the non-cancer benchmark for acute exposures for 50th and 95th percentile modeled outdoor (ambient) air concentrations. Therefore, there is no expectation of non-cancer risks to the general population exposures to indoor air from TRI facility releases based on this screening-level assessment.

4.3.4.3 Drinking Water

Acute doses for adults and infants (birth to <1 month) were calculated using the 95th percentile drinking water intake rate for all ages of 2.972 L/day, respective recommended bodyweights, (U.S. EPA, 2011a), and exposure duration (ED) of 365 days per year. Acute MOEs were calculated using an acute HED of 11.0 mg/kg-day. A benchmark of 30 was used for acute screening-level risk estimates. Hazard values and benchmarks are described in the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w). Both adult and infant acute MOEs were above the benchmark (Table 4-18). Therefore, it was not necessary to refine the conservative assumptions of the screening level assessment. See Section 6.4.1 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for more details on the drinking water screening-level exposure assessment.

Table 4-18. Calculated Acute Drinking Water Doses for Adults and Infants

Age Group	Concentration (µg/L)	Dose (mg/kg-day)	Acute MOE (Benchmark = 30)
Adults	13.3	4.9E−04	2.2E04
	95	3.5E−03	3.1E03
Infant (birth to <1 month)	13.3	8.2E−03	1.3E03
	95	5.9E−02	1.9E02

4.3.5 Risk Characterization for Potentially Exposed or Susceptible Subpopulations

For this *o*-dichlorobenzene draft risk evaluation, EPA considered information that could support increased exposure or biological susceptibility compared to the general population. EPA also considered PESS throughout the exposure assessment, hazard identification, and dose-response analysis. In general, the Agency evaluates several factors that may contribute to a group having increased exposure or biological susceptibility. Examples of these factors include lifestage, pre-existing disease, occupational and certain consumer exposures, nutrition, and lifestyle activities. The Agency considered these PESS factors through the use of exposure factors, uncertainty factors, and PESS group-specific data (*e.g.,* toxicity data on males vs. females, exposures for fenceline communities or SEGs of workers; Table 4-19).

For the *o*-dichlorobenzene risk evaluation, EPA accounted for the following PESS groups: workers (including those with high-end exposures); consumers (including those with high-intensity use); older adults with reduced lung function; age groups who have higher intake per body weight (*e.g.*, infants); subpopulations who use untreated surface water or groundwater as a primary source of drinking water; and communities who live near facilities that emit *o*-dichlorobenzene. As further detailed in Table 4-19, EPA was able to incorporate considerations for the following PESS factors: lifestage, pre-existing disease, lifestyle/unique activities, occupational and consumer exposures, geography, genetics/epigenetics, and aggregate exposures. Additional information on other factors that could possibly impact greater biological susceptibility or exposure potential following exposure to *o*-dichlorobenzene—such as more comprehensive information on preexisting diseases in humans, nutritional status, or other chemical co-exposures and non-chemical stressors—was not reasonably available.

For the general population ambient air risk characterization, subpopulations that live within 100 to 1,000 m (0.062–0.62 miles) of the 22 TRI facilities were considered PESS due to their close proximity to *o*-dichlorobenzene facility releases. EPA accounted for the greater exposures to these subpopulations when assessing risk to the general population from the ambient air exposure pathway using the IIOAC to model ambient air concentrations based on facility releases. In addition, possible aggregate exposures from multiple facilities were qualitatively considered by evaluating the distance between TRI facilities in Section 4.3.6.

For the general population drinking water risk characterization, the 95th percentile drinking water intake rate across all ages and the recommended body weights for adults and infants (birth to <1 month) were used as exposure parameters to estimate conservative, high-end doses to account for subpopulations with high drinking water intake rates. In addition, the highest concentrations reported in surface water and groundwater were also taken into consideration for subpopulations that use untreated surface water or groundwater as a primary source of drinking water.

Table 4-19. Summary of PESS Factors Incorporated into Risk Estimates

PESS Factor	Potential Increased Exposures Incorporated into Exposure Assessment	Sources of Uncertainty for Exposure Assessment	Potential Sources of Biological Susceptibility Incorporated into Hazard Assessment	Sources of Uncertainty for Hazard Assessment
Lifestage	• Life stage-specific exposures were not incorporated into the draft risk evaluation for ambient air. • Exposure factors for body weight and intake rate by age group (adults and infants) were applied to calculate life stage-specific doses for drinking water.	• The estimates of dose are based on exposure parameters as recommended by the EPA's *Exposure Factors Handbook* (U.S. EPA, 2011a) and concentrations extracted from systematic review.	• EPA applied a 10× UF_H to account for reduced lung function in older adults, which could promote sensitivity to respiratory effects (Luoto et al., 2019).	• The magnitude of toxicokinetic differences in older adults is not well characterized and may be ≥10×, depending on the context of the hazard.
Pre-existing disease	• *Not applicable*	• *Not applicable*	• EPA applied 10× UF_H to account for human variability.	• Individuals with pre-existing diseases that increase susceptibility based on the ADME (absorption, distribution, metabolism, and excretion) or mode of action (MOA) of *o*-dichlorobenzene (*e.g.,* fatty liver disease, inflammatory respiratory conditions), who are exposed may not be accounted for by standard approaches.
Lifestyle activities	• EPA did not identify lifestyle activities that influence exposure.	• *Not applicable*	• EPA applied a 10× UF_H.	• No direct evidence available.
Occupational and consumer exposures	• Worker and consumer uses result in elevated exposures compared to the general population. • High-end exposure estimates were incorporated to account for high-intensity activities and use scenarios.	• For consumers, it is difficult to capture the entirety of use scenarios and range of potential parameters. Therefore, EPA conducted analysis of representative exposure scenarios (95th for acute and 50th for chronic). • EPA otherwise has robust confidence in the results of this assessment. The calculated concentrations and doses are	• *Not applicable*	• *Not applicable*

PESS Factor	Potential Increased Exposures Incorporated into Exposure Assessment	Sources of Uncertainty for Exposure Assessment	Potential Sources of Biological Susceptibility Incorporated into Hazard Assessment	Sources of Uncertainty for Hazard Assessment
		based on exposure parameters recommended by the EPA's *Exposure Factors Handbook* (U.S. EPA, 2011a).		
Geography/Site-specific	• Populations who reside nearby facility releases of *o*-dichlorobenzene were taken into consideration with modeled exposure concentrations by distance (100–1,000 m away) • Meteorological dataset and land use settings in IIOAC were selected for conservative modeled air concentrations as recommended by the user guide.	• The estimates of risks via ambient air are dependent on inputs and assumptions described in Section 6 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* and calculations based on equations from the IIOAC as detailed in in the User Guide (U.S. EPA, 2019c).	• *Not applicable*	• *Not applicable*
Sociodemographic status	• EPA did not identify sociodemographic factors that influence exposure.	• *Not applicable*	• EPA utilized the most sensitive sex from animal studies for noncancer dose-response modeling.	• EPA was unable to quantify sociodemographic differences other than sex.
Nutrition	• *Not applicable*	• *Not applicable*	• Quantitative data for this chemical is not available based on differing eating habits or obesity.	• No direct evidence available
Genetics/ epigenetics	• *Not applicable*	• *Not applicable*	• EPA applied a 10× UF_H.	• Hazard values are based on wild-type rodents and a broad occupational population
Unique activities	• Subpopulations that use untreated surface water or groundwater as primary source of drinking water were taken into consideration.	• The estimates of dose are based on exposure parameters as recommended by the EPA's *Exposure Factors Handbook* (2011b) and groundwater concentrations extracted from systematic review.	• *Not applicable*	• *Not applicable*
Aggregate exposures	• Aggregate general population exposures from nearby facilities were considered qualitatively (Section 4.3.6).	• Aggregation of exposures across routes was not applied, however there was no risk from	• *Not applicable*	• *Not applicable*

PESS Factor	Potential Increased Exposures Incorporated into Exposure Assessment	Sources of Uncertainty for Exposure Assessment	Potential Sources of Biological Susceptibility Incorporated into Hazard Assessment	Sources of Uncertainty for Hazard Assessment
		very conservative screening approaches for each route.		
Other chemical and non-chemical stressors	• *Not applicable*	• *Not applicable*	• These factors were considered qualitatively; no direct evidence was available to support quantitative incorporation.	• No direct evidence available.

4.3.6 Risk Characterization for Aggregate and Sentinel Exposures

Section 6(b)(4)(F)(ii) of TSCA requires EPA, as a part of the risk evaluation, to describe whether aggregate or sentinel exposures under the conditions of use were considered and the basis for their consideration. Furthermore, in the final RE framework rule, the Agency codified at 40 CFR 720.39(d)(8) a requirement that "EPA will consider aggregate exposures to the chemical substance, and, when supported by reasonably available information, consistent with the best available science and based on the weight of scientific evidence, include an aggregate exposure assessment in the risk evaluation, or will otherwise explain in the risk evaluation the basis for not including such an assessment."

Occupational and consumer exposures were not aggregated across routes. Aggregate exposures can only be used for aggregating risks for a systemic endpoint that would be exhibited regardless of route. The inhalation POD is for respiratory toxicity, which is route-specific and would be protective of systemic liver effects that require higher exposures. Inhalation risk characterization therefore serves as a type of sentinel risk assessment across routes, and risks for liver toxicity are only estimated to characterize risks independently of inhalation exposure.

For general population exposures, the IIOAC does not model aggregate concentrations from multiple facilities; therefore, aggregate exposures to multiple TRI facility releases were not quantitatively assessed but considered qualitatively for the general population ambient air risk characterization. EPA located the TRI facility with highest releases: SABIC Innovative Plastics Mt. Vernon LLC (TRI 47620GPLSTLEXAN) and searched for other TRI facilities nearby; the two nearest TRI facilities are located approximately 100 miles (160 km) and 150 miles (240 km) away. Other air dispersion models, such as HEM,[8] have the capability to model aggregate exposures from multiple facilities but is limited to facilities that are within 31 miles (50 km) of each other. Due to the greater distance between SABIC Innovative Plastics Mt. Vernon LLC and the nearest two TRI facilities, EPA does not expect aggregate exposures from multiple facility releases to be a concern for the general population.

The Agency defines sentinel exposure as "the exposure from a chemical substance that represents the plausible upper bound of exposure relative to all other exposures within a broad category of similar or related exposures" (40 CFR 702.33). In terms of this draft risk evaluation for *o*-dichlorobenzene, EPA considered sentinel exposures by considering risks to human populations who may have upper-bound exposures; for example, workers who perform activities with higher exposure potential or certain physical factors like body weight or skin surface area exposed. The Agency characterized high-end exposures in evaluating exposure using both monitoring data and modeling approaches. Where statistical data are available, EPA typically uses the 95th percentile value of the available dataset to characterize high-end exposure for a given COU, or otherwise uses high-end assumptions when performing tiered assessments, such as was performed for consumer risk characterization. Because risks were not identified for the general population or most consumer COUs using these conservative sentinel exposure approaches, aggregation was not needed.

4.3.7 Overall Confidence and Remaining Uncertainties in Human Health Risk Characterization

4.3.7.1 Workers

Overall confidence in the human health risk characterization for occupational workers ranged from "slight-to-moderate" to "robust" depending on the individual OES (See Table 4-5). This confidence is

[8] https://www.epa.gov/fera/risk-assessment-and-modeling-human-exposure-model-hem (accessed August 4, 2026)

also based on EPA's use of methodologies and models in TSCA risk evaluations that previously underwent peer review and public comment along with the robust confidence in the inhalation POD for respiratory toxicity and the oral/dermal POD for liver toxicity as described in Section 4.2.1.

Risk estimates due to inhalation exposure for 6 of the 20 assessed OESs were based on direct, scenario-specific, full-shift *o*-dichlorobenzene monitoring data. These data were obtained through test orders for one OES, OSHA CEHD database for three OESs, and reports from systematic review for two OESs. Using monitoring data specific to the chemical from a use that is being assessed are the preferred type of data to use, because these will be the most accurate portrayal of the exposures that workers in the field may be experiencing. For the OES of Industrial Use in Solvents, EPA used test order data that were recent, obtained using an established method, numerous, and with few non-detect values. Because of these factors, this OES obtained a robust confidence rating.

However, even if it is preferred, there are aspects that decrease confidence in monitoring data, including if it is chemical- and scenario-specific. These aspects include age of the samples, associated metadata (such as how much detail there is on the worker descriptions associated with the dataset), number of samples, and the limit of detection for the dataset. The OSHA CEHD and systematic review data used in this assessment were from the 1980s and 1990s. Data that is not recent will decrease confidence in the exposure estimates because it is uncertain whether the samples represent current industry practices. Fewer data points in a dataset also decrease confidence because it is less likely that the range of possible exposure is being represented. Many non-detects may also reduce confidence due to assumptions that must be made to estimate exposure for each of the non-detects—though datasets with one or some detected values allow for more confidence in the high-end estimates as an upper bound. In the OES of Use of Ink, Toner, and Colorant Products, among 23 partial-shift samples (that together comprised 4 full-shift samples), EPA had only 1 partial shift sample that was above the method's LOD. This detected value adds confidence that the chemical is present on-site and that it may be present at levels as high as indicated; however, the lack of data below this measured value causes greater uncertainty particularly in what the central tendency exposure during this use may look like. These factors, along with the age of the dataset, resulted in this OES receiving a moderate rating.

Confidence can be bolstered if two estimation methods are combined to strengthen confidence in a result. For the OES of Use of Cleaning and Furnishing Care Products, EPA had two directly applicable, partial shift samples of *o*-dichlorobenzene that combined into a single full-shift sample. Although this was a detected sample, it was from 1995 and lacked worker activity descriptions to assist in deciphering what use the monitoring data was associated with. To bolster the confidence in this estimate, EPA used surrogate data from a generic scenario, Chemicals Used in Furnishing Cleaning Products (U.S. EPA, 2022). The surrogate data from this generic scenario provided an exposure result closely aligned with the single CEHD full-shift sample for this OES. These two methods combined resulted in a rating of moderate for this OES.

When directly applicable data was not available, in some cases EPA used monitoring data from the same chemical but a different use as analogous. The Agency used analogous data for two OESs (Repackaging and Functional Fluids). Using chemical-specific monitoring data from a similar activity is the strength of analogous data. In the case of the Repackaging OESs, EPA used monitoring data from a facility that uses *o*-dichlorobenzene as a solvent during tasks such as loading and unloading of the chemical. These are activities that would be expected to occur at a repackaging site, and because the dataset is recent and of high quality, EPA rated the confidence in this OES as robust. For the Functional Fluids OES, EPA did not find data directly relevant to this use but expects that the highest exposure to the chemical during this OES would occur during chemical loading and unloading. Therefore, EPA used the loading and unloading data for this OES as well, and it received a rating of moderate-to-robust.

For six OESs, EPA used monitoring data from other chemicals being used for the same or a similar use as surrogate. The strength of surrogate data is the use of exposure data directly applicable to the specific activity that occurs during the relevant OES. Corrections for vapor pressure and concentration increase the confidence that surrogate exposure data may be representative, but there remains uncertainty due to the differences in chemical properties. There is also uncertainty introduced due to possible differences in handling practices of different chemicals. *p*-Dichlorobenzene, an isomer of *o*-dichlorobenzene, was the most common and most preferred surrogate used in this draft assessment due to the two chemicals' similar uses and chemical properties. The Use of Laboratory Chemicals OES used *p*-dichlorobenzene laboratory technician data as a surrogate, but since that dataset was entirely non-detects, EPA bolstered the assessment using a second surrogate of 1,1,2-trichloroethane (1,1,2-TCA). As a result, the OES received a moderate confidence rating. Disposal used *p*-dichlorobenzene as a surrogate, but again the dataset was entirely non-detects, and because EPA was unable to find another method to estimate the exposure to this use, this OES received a slight-to-moderate confidence rating.

When inhalation exposure monitoring was unavailable, modeling was used to estimate occupational exposure. Probabilistic modeling was performed to assess exposures for one OES (Use of Lubricants and Greases) and GS/ESDs were used to assess exposures for two OESs (Use of Paints and Coatings and Use of Fuels and Related Products). Modeling introduces uncertainty because often default inputs must be used and the representativeness of these model inputs to the specific chemical of interest may be unknown. It is also unknown if modeled air concentrations match the true distribution of inhalation concentrations for the industries and sites covered by the specific scenario, because there are not monitoring data with which to compare it. The strength of these models includes the fact that many parameters they use are derived from applicable exposure scenarios, and in most cases, EPA had some *o*-dichlorobenzene-specific information to input into the model such as concentration data from products currently on the market. The use of Monte Carlo modeling (used in the Use of Lubricants and Greases OES) increases confidence in a modeling estimate because it captures variability by allowing ranges of inputs. These modeled OESs each received a moderate rating.

In three cases (Use in Solid Air Care Products, and Sheep Branding Fluid, Use of Other Cleaning Products), EPA's CEM was adjusted for occupational use. This was done in cases when no monitoring data were available and it was deemed the consumer model would be the most representative option due to the nature of the worker activities. In these cases, the worker exposure is expected to be similar to the exposures a consumer may experience, though in each case it is assumed the activity would occur more frequently in an occupational setting. These three estimates had moderate confidence.

Dermal exposure was modeled for all OESs, primarily using a fractional absorption approach with Monte Carlo modeling to account for the range of possible input values. The exposure scenarios and exposure factors underlying the dermal assessment that was conducted are supported by moderate-to-robust evidence. Exposure factors for occupational dermal exposure include amount of material on the skin, surface area of skin exposed, and absorption of *o*-dichlorobenzene through the skin. These exposure factors were informed by literature sources, the ChemSTEER User Guide (U.S. EPA, 2015) for standard exposure parameters, and test order data (Charles River Laboratories, 2025). A source of uncertainty includes how well input parameter distributions reflect real-world conditions, and the absorption of *o*-dichlorobenzene is based on absorption data from *p*-dichlorobenzene. However, *p*-dichlorobenzene is an isomer to *o*-dichlorobenzene and so it is expected to be a reasonable surrogate. The dermal assessment also often used known concentrations of *o*-dichlorobenzene, which increased confidence. Because of these factors, EPA concluded that the weight of scientific evidence for the dermal exposure assessment was moderate for all OESs.

General uncertainties that contribute to all OESs include the facility-level differences in practices and engineering controls that are largely undocumented, along with the assumed exposure days, which may not reflect actual staffing, rotations, or overtime. Estimating the number of potentially exposed workers (see Table 4-4) also carries uncertainty due to NAICS/SOC mapping from 3 to 5 to 6 digits, and dermal input distributions (*e.g.*, skin loading) may not fully represent real-world variability across OESs.

Relative to the risk calculations, there is reduced confidence in conclusions of potential risks when risks relative to benchmark are indicated only at higher-end exposures, though these higher-end exposures may still occur in an acute exposure scenario. Conversely, there is robust confidence when high-end exposures did not indicate risk relative to benchmarks. Confidence is also downgraded when ONU data were not available; in such cases, EPA assumed that the central tendency worker value was an appropriate approximation for ONUs, but the validity of this assumption is likely to vary widely across COUs and SEGs.

EPA has information on some exposure controls, PPE, and respirators used for some job groups and OESs. However, the effect of engineering controls and dermal PPE such as use of gloves cannot be quantified, and the Agency can only confidently calculate reduced risk estimates from respirator usage assuming use throughout an entire shift. Qualitative consideration of dermal PPE for the purpose of determining unreasonable risk is discussed for each COU, as appropriate, in Section 6.1.3. The available information does not cover all COUs or all facilities within those COUs.

More information on current uses of *o*-dichlorobenzene, particularly in the Commercial setting, would assist in increasing the confidence of this draft assessment. Helpful information includes more recent air monitoring data and more details about the worker activities that occur during these scenarios when *o*-dichlorobenzene is used. See the Executive Summary for more on EPA's information request.

Details for confidence in the exposure assessment for all OESs are summarized in Section 4.1.1.3 and within Section 8.3 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

4.3.7.2 Consumers

EPA has robust confidence in the exposure and risk assessment for consumers. Key strengths of the assessment include that the consumer inhalation exposure assessment is supported by high- or medium-quality indoor air monitoring studies that support the concentrations found from consumer modeling, allowing EPA to identify inhalation as a key driver of exposure for consumers. The concentrations modeled in this draft assessment are either on the same order of magnitude or less than the concentrations from monitoring studies, thus further supporting the findings from this evaluation. This confidence is also based on the Agency's use of methodologies and models that previously underwent peer review and public comment along with the robust confidence in the inhalation POD for respiratory toxicity and the oral/dermal POD for liver toxicity as described in Section 4.2.1.

In addition, CEM and IECCU, as well as dermal modeling approaches have been peer reviewed. The products evaluated in this assessment reflect what was found in the consumer market at the time of this draft risk evaluation and were verified with product searches. The CEM modeling was parameterized with weight fractions acquired from product SDS and activity/product use pattern data from the EPA's *Exposure Factors Handbook* (U.S. EPA, 2011b). The fractional absorbed and permeability dermal models are peer reviewed and have been used extensively and been applied in previous and current dermal exposure assessments by OPPT previous risk evaluations, which have gone through SACC review (Frasch and Bunge, 2015; ten Berge, 2009).

Overall, EPA has used the scientifically, reasonably available information available in the consumer exposure assessment. EPA also used representative modeling inputs, such as duration and frequency of use, as well as environmental characteristics that are from peer-reviewed sources. Although the models may simplify what a consumer is exposed to, the estimates represent realistic uses for these products. The lines of evidence support EPA's use of the modeled concentrations in this assessment to derive risk estimates and inform consumer risk determination and rulemaking for *o*-dichlorobenzene.

EPA has high confidence that risk estimates calculated with these exposure scenarios are above the benchmark do not indicate potential risk. Combined with the robust confidence in the inhalation and dermal hazard data that are applicable across all durations, along with exposure modeling that is well supported and defines high-intensity use, the Agency has high confidence that exposure to products containing *o*-dichlorobenzene will not pose risk to the consumer.

4.3.7.3 General Population

EPA has robust confidence in the overall risk characterization of the general population assessment and that the exposure scenarios represent a conservative upper bound on exposure. This confidence is also based on the Agency's use of methodologies and models that previously underwent peer review and public comment along with the robust confidence in the inhalation POD for respiratory toxicity and the oral/dermal POD for liver toxicity as described in Section 4.2.1. Therefore, EPA has robust confidence that the conservative exposure scenarios along with the robust confidence in the PODs are not underestimating risk estimates for the general population.

Furthermore, EPA has robust confidence in the use of facility-reported release data from TRI as model inputs. Modeled results using the TRI dataset were used to derive exposure concentrations at distances from releasing facilities where individuals and ecological organisms reside for many years. The use of release data across multiple years of data provides a comprehensive ambient air exposure assessment and helps ensure higher release years are not missed, which provides added confidence to EPA's use of modeled concentrations to characterize exposures. Additionally, use of actual reported TRI releases provides added confidence that modeled concentrations and exposures are representative of exposures from facility reported releases and not hypothetical.

Moreover, EPA presented monitoring data for *o*-dichlorobenzene from the AQS. When EPA-modeled concentrations are compared to AQS monitoring data, modeled concentrations generally are within the same order of magnitude with monitored concentrations. Although Padilla et al. (2024) found that nationwide measured concentrations of 79 hazardous air pollutants (HAPS) tend to be higher than modeled concentrations in 74% of comparisons over all monitors, chemicals, and years assessed, this was not the case for the screening-level risk estimates of *o*-dichlorobenzene where the highest 50th and 95th percentile modeled concentrations at 100 m were higher than the highest 24-hour concentrations reported in AQS. This may lead to an overestimation of risk estimates based on IIOAC-modeled concentrations, but this conservative approach is appropriate for a screening analysis.

It is also important to note that EPA acknowledges that the modeled and monitoring concentrations are not necessarily directly comparable because air monitoring stations are (1) located throughout the United States in different topographical settings (urban, suburban, rural); (2) spatially vary across distances other than those defined in model outputs; (3) specific to a select moment in time, location, season, and immediate weather conditions; and (4) representative of total ambient concentrations from all contributing sources (*i.e.*, COU-specific sources and other sources). In contrast, modeled concentrations are COU-specific, represent concentrations in defined topographical settings with defined meteorological data at defined distances from the releasing source, and include assumptions of continuous releases over time. Padilla et al. (2024) also concluded that "as long as ambient air monitoring remains sparse, the exposure models that we evaluated and similar modeling systems are the best available tools for large-scale screening level risk assessments"—providing support to EPA's use of modeled concentrations to derive risk estimates.

Taken together, the various modeling and monitoring lines of evidence considered by EPA in this general population exposure assessment for *o*-dichlorobenzene give the Agency robust confidence in its characterization of general population and environmental exposures. Additionally, the various lines of evidence support EPA's use of the modeled concentrations in this assessment to derive risk estimates and inform risk determination and rulemaking for *o*-dichlorobenzene.

EPA has robust confidence in the drinking water screening-level exposure assessment for the general population. The exposure parameters used in this assessment from the EPA *Exposure Factors Handbook* (U.S. EPA, 2011b) were selected to evaluate high-end, conservative, health-protective exposure scenarios to inform whether there are exposures (and associated risk estimates) of concern for age groups ranging from infants (birth to <1 month) to adults. Furthermore, the highest concentrations reported in surface water and groundwater were taken into consideration for subpopulations that use untreated surface water or groundwater as a primary source of drinking water.

5 ENVIRONMENTAL RISK ASSESSMENT

_o_-Dichlorobenzene – Environmental Risk Assessment: Key Points

EPA evaluated the reasonably available information for environmental exposures to *o*-dichlorobenzene. The key points of the environmental exposures and hazards assessment are summarized below.

- Although *o*-dichlorobenzene may be released to water, land, and air, *o*-dichlorobenzene concentrations were not modeled for the surface water and land pathways because there are no direct releases to land that would result in exposure (release occurs via underground injection or landfill), and surface water releases are negligible and do not yield concentrations of concern (COCs).
    - *o*-Dichlorobenzene is not expected to persist in soil and water based on physical and chemical properties as well as environmental fate and transport characteristics.
- EPA qualitatively assessed environmental exposures of *o*-dichlorobenzene in soil.
    - *o*-Dichlorobenzene is not released directly to soil and modeled air to soil deposition is negligible due to the physical and chemical properties (volatility and low sorption to organic material).
- A screening-level approach was used to assess potential risk to aquatic organisms from *o*-dichlorobenzene in surface water.
    - *o*-Dichlorobenzene is not expected to be present in surface water given minimal releases to surface water and losses from volatilization; it also has low sorption potential and is not expected to be present in sediment.
    - Monitoring concentrations show *o*-dichlorobenzene is rarely detected in water (>99% samples below detection). Furthermore, releases to water (<1% of total releases) do not result in concentrations that exceed concentrations of concern—even in low flow scenarios.
- *o*-Dichlorobenzene releases in air are expected to be the primary pathway of environmental exposure.
    - Extensive ambient air monitoring data are available for *o*-dichlorobenzene and confirm that air is the primary exposure pathway.
    - Concentrations of *o*-dichlorobenzene in ambient air are likely from a combination of TSCA-regulated sources and other sources.
    - EPA summarizes available *o*-dichlorobenzene ambient air monitoring data in this assessment.
- There is no expected risk to aquatic organisms as *o*-dichlorobenzene is not appreciably released to, and does not persist in, surface water, and exposure is not expected.
- There is no expected risk to terrestrial organisms through soil exposure as *o*-dichlorobenzene does not partition, deposit, or persist in or on land, and exposure is not expected.
- Although exposure of *o*-dichlorobenzene to terrestrial organisms is expected via ambient air, exposures will be transient and cannot be attributed to a specific TSCA condition of use.
- A screening analysis of potential risk to terrestrial organisms via ambient air exposure to *o*-dichlorobenzene was conducted:
    - The toxicity threshold for terrestrial vertebrate exposure via inhalation was 733 mg/m^3.
    - The highest modeled air concentration modeled was 24 μg/m^3 within 30 to 60 m away from the facility release point; the highest concentration from ambient air monitoring data was 23.1 μg/m^3
    - Given that both the highest modeled and monitored concentrations of *o*-dichlorobenzene in ambient air are more than an order of magnitude lower than the most sensitive toxicity endpoint, risk to terrestrial organisms via air exposure is not expected.

5.1 Summary of Environmental Exposures

5.1.1 Air Pathway

Ambient air *o*-dichlorobenzene monitored concentrations from the AQS database ranged from 0.0 to 23.1 μg/m^3 with 77.4% of *o*-dichlorobenzene samples collected between 2019 through 2023 reported as 0.0 μg/m^3 (U.S. EPA, 2026b). Ambient air concentrations were modeled using the Indoor-Outdoor Air Calculator (IIOAC) based on facility releases reported to TRI between 2019 to 2023. The 95th percentile ambient air modeled concentrations across all facilities, reporting years and modeled distances (100, 100–1,000 and 1,000 m) ranged from 0.0 to 26.2 μg/m^3 with the highest concentrations at 100 m from facility releases. See Section 5.2 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f) for more details and Section 3.3.2 for the weight of scientific evidence for environmental exposure from the air pathway.

5.1.2 Water Pathway

Exposure via the water pathway is expected to be minimal as described in Section 3.3.1.2. Surface water monitoring data from the water quality portal (WQP) indicate that *o*-dichlorobenzene is usually below detection limits (<1% detection frequency; highest detection limit = 0.5 μg/L) (U.S. EPA, 2026af). Similarly, all sediment samples (525 samples) from the WQP database measured *o*-dichlorobenzene at or below detection limits with a maximum detection limit of 0.17 μg/L (see the supplemental file *Water Quality Portal (WQP) Results for o-Dichlorobenzene and p-Dichlorobenzene* (U.S. EPA, 2026af)).

The maximum surface water concentrations extracted from peer-reviewed literature through systematic review ranged from below detection to 13.3 μg/L (Coiner et al., 2010; Chen and Zoltek, 1995); sediment concentrations ranged from below detection up to 1,570 μg/kg (Yun and Kannan, 2011; Coiner et al., 2010). See Section 5.3 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* for more details (U.S. EPA, 2026f) and Section 3.3.2 for the weight of scientific evidence for environmental exposure from the water pathway.

5.1.3 Land Pathway

Exposure via the land pathway is expected to be minimal as described in Section 3.3.1.3. The maximum measured concentration in groundwater was reported in WQP to be 19.9 μg/L (also see the supplemental file *Water Quality Portal (WQP) Results for o-Dichlorobenzene and p-Dichlorobenzene* (U.S. EPA, 2026af)) and the maximum soil concentration reported in peer-reviewed literature was 4.26 ng/g dry weight (Yun and Kannan, 2011; Jang and Townsend, 2001). See Section 5.4 of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* for more details (U.S. EPA, 2026f) and Section 3.3.2 for the weight of scientific evidence for environmental exposure from the land pathway.

5.2 Summary of Environmental Hazards

5.2.1 Environmental Hazard Thresholds

EPA evaluated the reasonably available information for environmental hazard endpoints for aquatic vertebrates and invertebrates, aquatic plants and algae, and terrestrial vertebrates and invertebrates following *o*-dichlorobenzene exposure. The complete environmental hazard assessment is available in Section 3 of the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w). The key points of the environmental hazards assessment are summarized below:

- Aquatic vertebrate and invertebrate concentration of concern (COC) with acute exposure to *o*-dichlorobenzene is 0.38 mg/L based on probabilistic modeling of empirical data.

- The most sensitive toxicity endpoint for aquatic plants and algae was 0.22 mg/L for exposure to *o*-dichlorobenzene (Galassi and Vighi, 1981).
- Chronic exposure to *o*-dichlorobenzene results in the lowest hazard threshold across taxa of 0.15 mg/L for aquatic vertebrates (Call et al., 1983) and 0.002 mg/L for aquatic invertebrates (Tong et al., 2010).
- Data from available human health animal models evaluating toxicity of *o*-dichlorobenzene to rats and mice via inhalation were used to evaluate potential toxicity to mammalian wildlife. The most sensitive toxicity endpoint across exposure durations and organisms was 559.2 mg/m^3 *o*-dichlorobenzene (Hollingsworth et al., 1958).

The selected environmental hazard thresholds for each receptor group and exposure duration are presented in Table 5-1. The environmental hazard thresholds were selected based on the best available science.

Table 5-1. Environmental Hazard Thresholds for *o*-Dichlorobenzene*[a]*

Receptor Group	Exposure Duration	Hazard Threshold (COC or HV)	Source
Aquatic Vertebrates	Acute	0.38 mg/L	SSD
	Chronic	0.15 mg/L	Call et al. (1983) (Medium)
Aquatic Invertebrates	Acute	0.38 mg/L	SSD
	Chronic	2.0E−03 mg/L	Tong et al. (2010) (Medium)
Aquatic Plants and Algae	N/A	0.22 mg/L	Galassi and Vighi (1981) (Medium)
Terrestrial Vertebrates (inhalation)	N/A	559 mg/m^3	Hollingsworth et al. (1958) (Medium)
Terrestrial Invertebrates	N/A	184 mg/L (above water solubility limit of 141 mg/L)	ECOSAR

COC = concentration of concern; ECOSAR = Ecological Structure Activity Relationships (ECOSAR) Predictive Model; HV = hazard value; SSD = species sensitivity distribution
[a] See *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* for additional details (U.S. EPA, 2026w)

5.2.2 Weight of Scientific Evidence Conclusions for Environmental Hazards

EPA used several considerations when weighing the scientific evidence to determine confidence in the draft environmental risk assessment. These considerations include the quality of the database, consistency, strength and precision, biological gradient/dose response, and relevance. This approach is consistent with the Draft Systematic Review Protocol (U.S. EPA, 2021a). EPA has robust confidence in this hazard threshold for acute *o*-dichlorobenzene exposure to aquatic vertebrates and invertebrates given the consistency in measured values documented (n = 51) across a range of species (n = 21) and moderate confidence in hazard thresholds for chronic aquatic exposure due to less empirical data available (number of values = 18; number of species = 7). There is moderate confidence in the hazard threshold for terrestrial mammal exposure to *o*-dichlorobenzene in ambient air. No reasonably available data were identified for evaluating the toxicity of *o*-dichlorobenzene to other terrestrial vertebrates (*e.g.*, birds), terrestrial invertebrates, or plants. However, predicted toxicity to earthworms using ECOSAR (Ecological Structure Activity Relationships Predictive Model) indicates that toxicity is likely above solubility limits of *o*-dichlorobenzene (141 mg/L) suggesting *o*-dichlorobenzene is not bioavailable or toxic to terrestrial invertebrates at environmentally-relevant concentrations.

5.3 Environmental Risk Characterization

5.3.1 Risk Assessment Approach

EPA used information from all reasonably available sources to characterize exposure, hazard, and risk posed from *o*-dichlorobenzene to aquatic and terrestrial organisms. The Agency determined that based on the environmental fate properties of *o*-dichlorobenzene and releases of *o*-dichlorobenzene to water and land no *o*-dichlorobenzene exposure to terrestrial and aquatic organisms is expected via land pathways from COUs.

Although there are few direct releases of *o*-dichlorobenzene to surface water, physical and chemical properties indicate that *o*-dichlorobenzene can be present in water. Thus, a screening assessment was conducted using the highest maximum annual release of *o*-dichlorobenzene to surface water from DMR and TRI data from 2019 through 2023 (maximum release = 226 kg/yr TRI (U.S. EPA, 2026ag)) using a mass balance model:

Equation 5-1.

$$Q_s C_s = Q_d C_d + Q_r C_r$$

Where Q is discharge and C is concentration of the surface water body (subscript s), discharge point (subscript d) and subsequent receiving water body (subscript r) after mixing.

The model employs the conservative assumption of no volatilization though *o*-dichlorobenzene is moderately volatile. Additional assumptions include no *o*-dichlorobenzene present in the water body before discharge and annual release of *o*-dichlorobenzene over 250 days of the year. Note that the highest reported release of *o*-dichlorobenzene is 107 kg per year as reported to DMR (U.S. EPA, 2026ag). However several Form A facilities reported to TRI. These facilities are not required to report releases up to 226 kg per year.

Terrestrial organisms may be exposed to *o*-dichlorobenzene from COUs via the air pathway. A screening assessment compared modeled and measured environmental concentrations for ambient air with hazard values for terrestrial organisms.

5.3.2 Risk Estimates for Aquatic Species

Based on physical and chemical properties, *o*-dichlorobenzene volatilizes from water and minimally sorbs to sediment or organic matter. Environmental releases of *o*-dichlorobenzene to water are less than 1% of total releases to the environment (U.S. EPA, 2026ag). Furthermore, available monitoring data indicate *o*-dichlorobenzene is rarely detected in surface water (<1% of 3,029 available WQP samples (U.S. EPA, 2026af)). The maximum concentration of *o*-dichlorobenzene measured in surface water from available monitoring data is 13.3 µg/L, which is over an order of magnitude lower than the (1) acute aquatic hazard thresholds identified for vertebrates and invertebrates, (2) chronic hazard threshold for aquatic vertebrates, and (3) hazard threshold for aquatic plants and algae (U.S. EPA, 2026w). Although this maximum concentration (13.3 µg/L) exceeds the chronic hazard value for aquatic invertebrates (2 µg/L), *o*-dichlorobenzene is not expected to remain in surface water due to volatility.

While there are few direct releases of *o*-dichlorobenzene to surface water, physical and chemical properties indicate that *o*-dichlorobenzene present in water will partition to air via volatilization. Thus, a screening assessment was conducted using the highest maximum annual release of *o*-dichlorobenzene to surface water from DMR and TRI data from 2019 through 2023 (maximum release = 226 kg/yr). Resulting receiving water concentrations (C_r) do not exceed acute aquatic hazard concentrations of concerns (COC = 0.38 mg/L)—even under low flow conditions (<1 ft^3/s); see Table 6-7 in the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). The lowest flow reported in a receiving water body was 31 ft^3/s in Upper Otter Creek, Kentucky, which had a maximum *o*-dichlorobenzene annual discharge of 107 kg/yr.

Considering these lines of evidence, *o*-dichlorobenzene is not expected to be present or persist in surface water at concentrations of concern. Therefore, based on this screening assessment, EPA concludes with robust confidence that exposure from any COU to aquatic organisms via the water pathway is not expected to exceed the hazard thresholds and additional refinement of conservative assumptions was not needed.

5.3.3 Risk Estimates for Terrestrial Species

o-Dichlorobenzene will volatilize from soil surfaces and is not expected to sorb to soils or organic matter based on its physical and chemical properties. The predominant environmental releases of *o*-dichlorobenzene to land are disposal via underground injection or landfills (U.S. EPA, 2026y). Therefore, there are no appreciable direct releases to land. Furthermore, modeled air deposition of *o*-dichlorobenzene to land is negligible (6.47 μg/kg per year), and available monitoring data indicate *o*-dichlorobenzene is rarely detected in groundwater (<1% of >500 samples; maximum concentration measured 19.9 μg/L) (U.S. EPA, 2026af). Considering these lines of evidence, *o*-dichlorobenzene is not expected to be present or persist on land. Therefore, based on this screening assessment, EPA concludes that exposure via the soil pathway from any COU to terrestrial organisms is not expected to exceed hazard thresholds. Environmental fate and transport data indicate *o*-dichlorobenzene does not bioaccumulate; thus, there is also no expected dietary exposure of *o*-dichlorobenzene to terrestrial organisms and additional refinement of conservative assumptions was not needed.

Terrestrial organisms may be exposed to *o*-dichlorobenzene via ambient air, and extensive ambient air monitoring data are available. These data show that *o*-dichlorobenzene is prevalent in ambient air and confirms that air is a major *o*-dichlorobenzene exposure pathway. A potential terrestrial *o*-dichlorobenzene exposure scenario may involve a fugitive or stack *o*-dichlorobenzene release to ambient air from a COU that is inhaled by terrestrial organisms located in proximity to the release facility. Many terrestrial organisms are transient in the environment. As such, the aforementioned exposure scenario is most applicable to local and non-transient organisms such as plants. However, there are no available plant hazard data for *o*-dichlorobenzene that evaluate apical endpoints (*i.e.*, growth, reproduction, mortality) and there is uncertainty in attributing exposure to a TSCA source. Therefore, risk to terrestrial plants cannot be determined.

Data from human health animal toxicity studies document some adverse effects of acute and chronic *o*-dichlorobenzene inhalation on terrestrial vertebrates with a geometric mean of the NOAELs on reproduction and body weight at 733 mg/m^3 (U.S. EPA, 2026w). Adverse effects ranged from 93 ppm (559 mg/m^3) in rats with 6 months exposure yielding changes in body weight (Hollingsworth et al., 1958) to 400 ppm (2,400 mg/m^3) with 10 days exposure yielding changes in body weight and effects on reproduction (Hayes et al., 1985). The highest ambient air concentration modeled was 24 $\mu g/m^3$ *o*-dichlorobenzene at 100 m away from a facility release point, and the highest monitored concentration in ambient air was 26 $\mu g/m^3$ *o*-dichlorobenzene (U.S. EPA, 2026f). Modeled and measured *o*-dichlorobenzene concentrations in ambient air are an order of magnitude lower than the most sensitive toxicity endpoint available for vertebrates (559 mg/m^3). Therefore, based on this screening assessment, EPA concludes that exposure via the air pathway is not expected to exceed the hazard threshold and additional refinement of conservative assumptions was not needed.

5.3.4 Overall Confidence and Remaining Uncertainties Confidence in Environmental Risk Characterization

EPA uses several considerations when weighing the scientific evidence to determine confidence in the environmental risk assessment. These considerations include the quality of the database, consistency, strength and precision, biological gradient/dose response, and relevance. This approach is consistent with the Draft Systematic Review Protocol (U.S. EPA, 2021a). EPA has robust confidence in this environmental risk assessment.

The Agency has robust confidence in the conclusion that exposure to aquatic organisms from COUs is expected to be less than hazard thresholds. Multiple lines of evidence support this conclusion. Environmental fate and transport data indicate *o*-dichlorobenzene is expected to be negligible in surface water. There are also limited releases of *o*-dichlorobenzene directly to surface water from COUs, and available monitoring data demonstrate that *o*-dichlorobenzene is rarely detected in surface water. Furthermore, modeled surface water concentrations are below the acute aquatic hazard value indicating no expected risk to aquatic organisms.

EPA has robust confidence in the conclusion that exposure to terrestrial organisms from COUs via the land pathway is expected to be less than the hazard thresholds. Multiple lines of evidence support this conclusion. Environmental fate and transport data indicate *o*-dichlorobenzene does not sorb or bind to soil or sediment and has negligible persistence on land (due to volatility). There are also no reported direct releases of *o*-dichlorobenzene to land. These chemical and fate properties support a robust confidence conclusion.

EPA also has robust confidence that exposure to terrestrial organisms from COUs via the dietary pathway is expected to be less than the hazard thresholds. Environmental fate and transport data indicate *o*-dichlorobenzene does not bioaccumulate. Because *o*-dichlorobenzene is also not expected to be present or persist in the water and land pathways, the potential for dietary exposure is limited. These qualities support a robust confidence conclusion.

EPA has moderate confidence that exposure to terrestrial organisms from COUs via the ambient air pathway is expected to be less than the hazard threshold. The Agency relies on human health animal toxicity models for hazard thresholds as there are no reasonably available empirical studies evaluating toxicity to wildlife. Measured and modeled concentrations of *o*-dichlorobenzene in ambient air are over an order of magnitude lower than the most sensitive toxicity endpoint in available animal data. However, sensitivities to *o*-dichlorobenzene likely vary among taxa and no data evaluating toxicity of *o*-dichlorobenzene to wildlife (*e.g.*, birds, amphibians, ungulates) are available.

Additional details on overall confidence and remaining uncertainties are described in the following TSDs: *Draft Human Health and Environmental Hazard Assessment of o-Dichlorobenzene* (U.S. EPA, 2026w) and *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

6 UNREASONABLE RISK DETERMINATION

TSCA section 6(b)(4) requires EPA to conduct a risk evaluation to determine whether a chemical substance presents an unreasonable risk of injury to health or the environment, without consideration of costs or other non-risk factors, including an unreasonable risk to a PESS identified by EPA as relevant to this risk evaluation, under the COUs.

EPA has preliminarily determined that *o*-dichlorobenzene presents unreasonable risk of injury to human health based on non-cancer risk for 15 COUs of the 24 total COUs assessed: including risk to workers from 14 COUs driven by acute inhalation and/or dermal exposure, risk to ONUs driven by inhalation exposure from 8 of those 14 COUs, and risk to consumers driven by inhalation exposure from 1 COU (Table ES-1). The Agency preliminarily did not identify unreasonable risk of injury to human health for the general population, including fenceline communities. Likewise, EPA preliminarily did not identify unreasonable risk of injury to the environment—including aquatic and sediment-dwelling vertebrates and invertebrates, aquatic plants, terrestrial vertebrates (birds and mammals) and invertebrates, and terrestrial plants—due to *o*-dichlorobenzene exposures via soil, air, surface water, and sediment under the COUs.

EPA's preliminary unreasonable risk determination is based on the information in previous sections of this draft risk evaluation, appendices, TSDs, and supplemental files (Appendix C) in accordance with TSCA section 6(b). This preliminary unreasonable risk determination and the underlying evaluation are consistent with the best available science (TSCA section 26(h)) and based on the weight of scientific evidence (TSCA section 26(i)).

o-Dichlorobenzene is a liquid at ambient temperatures with low-to-moderate water solubility and sorption to soil, sediment, or organic matter. Releases are primarily to air, and *o*-dichlorobenzene will generally remain in air, with potential for long-range transport given its persistence and limited degradation. *o*-Dichlorobenzene is rarely detected in surface water, sediment, soil, or groundwater. It is not expected to be present or persist on land or in water given the negligible releases and its volatility, lack of sorption to soil or organic matter, and the negligible air deposition. *o*-Dichlorobenzene is primarily imported into the country, with a total production volume (domestic manufacturing volume + the imported volume) in the United States of less than 1,000,000 lb between 2016 and 2019 (U.S. EPA, 2020b). *o*-Dichlorobenzene is also domestically manufactured as a byproduct. Several industrial, commercial, and consumer uses were identified, ranging from industrial use in solvents (which become part of product formulation or mixtures) and commercial and consumer use in inks and toners, paints and coatings, lubricants and greases, fuel additives, and use in air care products as continuous-action air fresheners, and cleaning and furnishing care products. In addition to exposure to aquatic and terrestrial vertebrates, invertebrates, and plants, EPA anticipates that workers and consumers may be exposed to *o*-dichlorobenzene from inhalation and dermal routes, and the general population may be exposed through ambient air, indoor air, and ingestion of drinking water.

As explained in Section 4.2.1, EPA derived a single hazard value which was applicable across all exposure durations (acute, intermediate, and chronic). Confidence in this single inhalation POD is robust, supported by consistent evidence from both apical studies and transcriptomic POD values. Robust confidence was also assigned to the oral/dermal liver toxicity POD, supported by consistent apical and transcriptomic PODs across multiple studies and species.

Determination of unreasonable risk was based only on acute duration exposure. As explained in Section 4.3.2, toxicity does not accumulate from repeated exposures. Instead, respiratory toxicity and liver toxicity demonstrate the same or decreasing severity over time. In other words, the acute, single-day studies provide more sensitive or equally sensitive endpoints compared to all exposure durations. Continued exposure functions as repeated repeat dosing studies in laboratory animals. As such, EPA has determined that evaluation of risks from a single day (*i.e.*, acute) exposure is protective for intermediate and chronic exposures and only acute risks are presented.

The COUs evaluated for *o*-dichlorobenzene are listed in Table 1-1. EPA has preliminarily determined that the following 14 COUs significantly contribute to unreasonable risk to workers, driven by acute inhalation and/or dermal exposure (indicated below):

- Manufacturing – Import (inhalation and dermal)
- Processing – As a reactant (inhalation and dermal)
- Processing – Incorporation into formulation, mixture or reaction product – Intermediates in all other basic organic chemical manufacturing (inhalation and dermal)
- Processing – Incorporation into formulation, mixture or reaction product – Solvents (which become part of product formulation or mixture) (inhalation)
- Processing – Incorporation into formulation, mixture or reaction product – Soap, cleaning compound, and toilet preparation manufacturing (inhalation and dermal)
- Processing – Repackaging (inhalation and dermal)
- Processing – Recycling (inhalation and dermal)
- Industrial use – Solvents (which become part of product formulation or mixture) – Printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing (inhalation and dermal)
- Industrial use – Functional fluids (closed system) – All other basic chemical manufacturing (inhalation and dermal)
- Industrial use – Non-incorporative activities – Processing aids, not otherwise listed (inhalation and dermal)
- Commercial use – Ink, toner, and colorant products – Ink and toners (inhalation)
- Commercial use – Paints and coatings – Coatings and paints, thinners, paint removers (inhalation) – note that the Use of Paints and Coatings OES contributes to unreasonable risk, but the Use of Paint Thinners and Removers OES under this COU does not significantly contribute to unreasonable risk.
- Commercial use – Lubricants and greases (inhalation)
- Commercial use – Other use – Laboratory chemicals (dermal); Cleaning and furnishing care products (inhalation and dermal) [Note that contribution to unreasonable risk for this COU is from both the Cleaning and Furnishing Care Products OES (dermal and inhalation exposure) and the Laboratory Chemicals OES (dermal exposure)].

Among these 14 occupational COUs, EPA has preliminarily determined that the following 8 COUs also significantly contribute to unreasonable risk to ONUs from inhalation exposure:

- Processing – As a reactant;
- Processing – Incorporation into formulation, mixture or reaction product – Intermediates in all other basic organic chemical manufacturing;
- Processing – Incorporation into formulation, mixture or reaction product – Solvents (which become part of product formulation or mixture);
- Processing – Incorporation into formulation, mixture or reaction product – Soap, cleaning compound, and toilet preparation manufacturing;
- Processing – Recycling;
- Industrial use – Solvents (which become part of product formulation or mixture) – Printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing

- Industrial use – Non-incorporative activities – Processing aids, not otherwise listed; and
- Commercial use – Paints and coatings – Coatings and paints, thinners, paint removers.

EPA has preliminarily determined that one (1) COU significantly contributes to unreasonable risk to consumers driven by acute inhalation exposures:

- Consumer use – Other use – Other use including ceramics glaze, and cleaning and furnishing care products (*i.e.*, septic tank cleaners).

EPA preliminarily did not identify significant contributions to unreasonable risk to human health from the following nine (9) COUs:

- Manufacture – Domestic manufacture;
- Distribution in commerce;
- Disposal;
- Commercial use – Fuels and related products – Fuel additive;
- Commercial use – Air care products – Continuous action air fresheners;
- Consumer use – Paints and coatings – Thinners, sheep branding fluid;
- Consumer use – Lubricants and greases;
- Consumer use – Fuels and related products – Fuel additive; and
- Consumer use – Air care products – Continuous action air fresheners.

In total, 15 out of 24 COUs significantly contribute to the unreasonable risk from *o*-dichlorobenzene.

EPA notes that uses that are not subject to TSCA (*e.g.,* pesticides) resulting in human or environmental exposure to *o*-dichlorobenzene were not evaluated as COUs because these uses are explicitly excluded from TSCA's definition of chemical substance. Thus, it is not appropriate to extrapolate from this preliminary risk determination to form conclusions about uses of *o*-dichlorobenzene that are not subject to TSCA and that EPA did not evaluate as COUs.

For some COUs the Agency had limited information to derive risk estimates (such as MOEs or risk quotients [RQs]) to support a determination of whether the COU significantly contributes to unreasonable risk of injury to human health or the environment. In such cases, EPA integrates reasonably available information; for example, physical and chemistry properties and available monitoring data in a risk characterization using a weight of evidence approach and professional judgment to support conclusions. The risk characterizations of COUs that EPA evaluated qualitatively present what the Agency expects given the weight of scientific evidence.

The unreasonable risk determination must be based on the best available science and supported by the weight of scientific evidence, and in making a finding of "presents unreasonable risk," EPA considers risk-related factors beyond exceedance of benchmarks. Risk-related factors include the type and severity of health effects under consideration; the reversibility of the health effects being evaluated; exposure-related considerations (*e.g.,* duration, magnitude, frequency of exposure) or population exposed (including PESS); and confidence in the information, including the strength of the exposure data. These are also used to inform the hazard and exposure values. EPA also considered, where relevant, the Agency's analyses on aggregate and sentinel exposures (Section 4.3.6). Additionally, in this draft risk evaluation, EPA describes the strength of the scientific evidence supporting the human health and environmental assessments as robust, moderate-to-robust, moderate, slight-to-moderate, or slight.

This draft risk evaluation discusses important assumptions and key sources of uncertainty; these are described in more detail in the respective weight of scientific evidence conclusions sections for fate and transport (Section 2.2), environmental releases and resulting concentrations (Sections 3.2 and 3.3), human exposures (Section 4.1), hazards (Section 4.2), and risk characterization (Section 4.3), environmental exposures (Section 5.1), hazards (Section 5.2), and risk characterization (Section 5.3). It also includes overall confidence and remaining uncertainties sections for human health (Section 4.3.7) and environmental (Section 5.3.4) risk characterizations. In general, EPA makes an unreasonable risk determination based on risk estimates that exceed the benchmark and have an overall confidence rating of slight-to-moderate, moderate, or robust because those confidence ratings indicate the scientific evidence is adequate to characterize risk estimates despite uncertainties or is such that it is unlikely the uncertainties could have a significant effect on the risk estimates.

6.1 Unreasonable Risk to Human Health

Calculated non-cancer risk estimates (margins of exposure [MOEs[9]]) can provide a risk profile of *o*-dichlorobenzene by presenting a range of estimates for different health effects for different COUs. When characterizing the risk to human health from occupational exposures during risk evaluation under TSCA, EPA conducts baseline assessments of risk and makes its determination of unreasonable risk in a manner that takes into consideration reasonably available information (*e.g.,* information submitted by manufacturers and processors of *o*-dichlorobenzene; representative site visits) regarding whether the use of respiratory protection or other PPE is standard practice at all sites. This allows EPA to make unreasonable risk determinations based on the available information regarding workers where the Agency has confidence that the information is representative.

In this draft risk evaluation, monitoring data submitted pursuant to test order submissions allowed EPA to make a preliminary unreasonable risk determination taking into consideration information regarding workers wearing PPE. For respiratory PPE, in many cases available information on respiratory protection indicated it was intended only for emergency use, or no information of any kind was available. For dermal PPE, while in general information indicates gloves are routinely indicated or expected, there are no established quantitative exposure factors for gloves, and EPA is unable to evaluate the reported usage of gloves in the context of specific exposure measurements or concentrations. In addition, the risk estimates are based on workplace exposure scenarios with monitoring data that reflect existing requirements, such as those established by OSHA (*i.e.,* permissible exposure limit [PEL]), and industry or sector exposure controls. In this draft risk evaluation, the risk estimates calculated reflect use both with and without PPE, including information on PPE that could be used to reduce the exposure.

To characterize risk from non-cancer endpoints, the estimated MOEs are compared to their respective benchmark MOE. The benchmark MOE accounts for the total uncertainty in a POD. The benchmark MOE is the product of several individual uncertainty factors relevant to a given POD with individual uncertainty factors (UFs), usually of 1, 3, or 10, which are ultimately multiplied together to provide the benchmark MOE. An MOE that is less than the benchmark MOE indicates risk and is a starting point for informing a determination of unreasonable risk of injury to health, based on non-cancer effects. It is important to emphasize that these calculated risk estimates alone are not "bright-line" indicators of unreasonable risk, and as noted previously, EPA uses discretion to consider other risk-related factors in addition to risks identified in the risk characterization.

[9] EPA derives non-cancer MOEs by dividing the non-cancer POD (HEC [mg/m^3] or HED [mg/kg-day]) by the exposure estimate (mg/m^3 or mg/kg-day). Section 4.3.1 has additional information on the risk assessment approach for human health.

As described in Section 4.2.2, while the existing cancer bioassay database is insufficient to evaluate carcinogenicity using standard approaches, the available evidence evaluated through the ReCAAP framework supports the conclusion that *o*-dichlorobenzene is unlikely to be carcinogenic to humans. Therefore, a quantitative cancer assessment is not warranted, as any additional cancer bioassays would be unlikely to provide evidence leading to different conclusions, and EPA did not derive a cancer hazard value for *o*-dichlorobenzene. The Agency has moderate-to-robust confidence in this conclusion.

6.1.1 Populations and Exposures EPA Assessed for Human Health

EPA has evaluated risk to workers (16+ years) including ONUs; consumers (adults and children); and the general population (including fenceline communities), using reasonably available monitoring and modeling data for inhalation, dermal, and ingestion exposures, as applicable. The Agency has evaluated risk from inhalation and dermal exposure of *o*-dichlorobenzene in the workplace. The Agency assessed the exposure of two occupational exposure groups: workers and ONUs. Workers work in close proximity to *o*-dichlorobenzene and may handle it whereas ONUs do not directly handle *o*-dichlorobenzene but may be indirectly exposed to it as part of their employment. The Agency also evaluated risk from inhalation and dermal exposures to consumers. For the general population, EPA has evaluated risk from the following: (1) acute and chronic inhalation exposure from ambient air; (2) acute and chronic inhalation exposure from indoor air; and (3) acute and chronic ingestion exposure from drinking water.

In developing the exposure and hazard assessments for *o*-dichlorobenzene, EPA has analyzed reasonably available information to ascertain whether some human populations may have greater exposure and/or susceptibility than the general population to the hazard posed by *o*-dichlorobenzene. As described in Section 4.3.5 and shown in Table 4-19, EPA was able to incorporate considerations for multiple PESS factors into risk estimates, through the use of exposure factors, UFs, and evaluation of specific populations with higher exposure. For the *o*-dichlorobenzene risk evaluation, EPA accounted for the following PESS groups: workers (including those with high-end exposures), consumers (including those with high-intensity use), older adults with reduced lung function, age groups who have higher intake per body weight (*e.g.*, infants), subpopulations that use untreated surface water or groundwater as a primary source of drinking water, and communities who live near facilities that emit *o*-dichlorobenzene. Additional information on other factors that could possibly impact greater biological susceptibility or exposure potential following exposure to *o*-dichlorobenzene—such as more comprehensive information on preexisting diseases in humans, nutritional status, or other chemical co-exposures and non-chemical stressors—was not reasonably available.

6.1.2 Summary of Human Health Effects

EPA has preliminarily determined that the unreasonable risk presented by *o*-dichlorobenzene is due to non-cancer effects in the following populations via the following listed exposures:

- non-cancer respiratory toxicity in workers and ONUs from acute inhalation exposures; and
- non-cancer liver toxicity in workers from dermal exposure.

The most appropriate and well-supported endpoint from inhalation exposure is respiratory toxicity with an HEC of 0.45 ppm (2.71 mg/m^3) and total UF of 30 and supported by two other co-critical PODs for the same effect. Similarly, oral and dermal exposure is best characterized by the tPOD of 8.25 mg/kg (UF = 30) for liver toxicity, also supported by two other co-critical PODs for adverse liver effects. EPA derived a single hazard value for inhalation and a single hazard value for oral/dermal exposure applicable across all exposure durations (acute, intermediate, and chronic). Confidence in the single PODs for inhalation and oral/dermal exposure is robust, supported by consistent evidence from both apical studies and transcriptomic point of departure estimates developed using an adaptation of EPA's

ETAP methods (U.S. EPA, 2024c). Additional information regarding the non-cancer hazard identification and the benchmark MOE is in Section 4.2.2 of this draft risk evaluation. Toxicity does not accumulate from repeated exposures. Instead, respiratory toxicity and liver toxicity demonstrate the same or decreasing severity over time. In other words, the acute, single-day studies provide more sensitive or equally sensitive endpoints compared to repeat dosing studies in laboratory animals. As such, EPA has determined that evaluation of risks from a single-day (*i.e.*, acute) exposure is protective for intermediate and chronic exposures and only acute risks are presented.

Based on the evidence integrated through this framework, EPA did not identify a human-relevant cancer hazard for *o*-dichlorobenzene. The Agency concluded that quantitative cancer risk assessment is not warranted since any additional cancer bioassays would be unlikely to provide evidence leading to a different conclusion. Because the integrated evidence does not indicate a likely cancer hazard, EPA did not derive a specific cancer hazard value. Instead, the Agency concluded that the selected non-cancer PODs, including transcriptomic PODs (tPODs) that capture highly sensitive, early-stage biological responses, effectively bound the risk for more severe downstream outcomes. Therefore, these non-cancer PODs considered protective of human health, including any potential carcinogenic effects.

6.1.3 Basis for Unreasonable Risk to Workers

Based on the occupational risk estimates and related risk factors, EPA has preliminarily determined that 14 out of the 19 COUs evaluated for workers (and ONUs) significantly contribute to unreasonable risk of *o*-dichlorobenzene driven by non-cancer risks from inhalation and/or dermal exposures. See Table 6-1 for risk estimates for each of these COUs.

6.1.3.1 Exposure Assessment Approach

Two COUs (Domestic manufacture and Distribution in commerce) were not evaluated quantitatively. For the remaining COUs, EPA used inhalation exposure estimates obtained from air monitoring or modeling to evaluate exposures to workers and ONUs. Inhalation monitoring data specific for *o*-dichlorobenzene were used for 11 COUs, and 4 COUs used surrogate inhalation monitoring data from other chemicals, with data from *p*-dichlorobenzene used for 3 COUs (Processing – Processing as a reactant; Processing – Incorporation into formulation, mixture or reaction product – Intermediates in all other basic organic chemical manufacturing; and Disposal) and data from 1,1,2-trichloroethane used for 1 COU (Commercial use – Other use – Laboratory chemicals). For these 15 COUs, both central tendency and high-end estimates are expected to be reflective of the range for worker inhalation exposures since these exposure estimates are based on monitoring data and there is potential for a worker to be exposed to the entire range of exposures.

Modeling data were used exclusively for three occupational COUs (Commercial use – Lubricants and greases; Fuels and related products – Fuel additive; and Air care products – Continuous action air fresheners), two OESs (Use of Paints and Coatings and Sheep Branding Fluid) under the COU Commercial use – Paints and coatings – Coatings and paints, thinners, paint removers, and one OES (Use of Other Cleaning Products under the COU Commercial use – Other use – Cleaning and furnishing care products). EPA used the estimated central tendency and high-end, full-shift TWA inhalation exposure concentrations to calculate exposure values to determine risk. For the modeling data, EPA considers both central tendency and high-end exposures to be representative of the range of worker exposures; however, the high-end exposures generally reflect a confluence of high-end values for the parameters included in the model (*e.g.,* due to low ventilation, high concentration, high use rate). See Section 4.1.1.1 and Table 4-5 for further details on the inhalation exposure assessment approach.

Dermal exposure was assessed for workers for relevant exposure scenarios for each COU. For ONUs, EPA did not assess dermal exposure to liquid *o*-dichlorobenzene because they are not expected to handle the liquid. However, EPA addressed dermal exposures to ONUs from solids as ONUs may encounter dust that settles on surfaces. The dermal exposure assessment, described in Section 4.1.1.2, was based on test order data on dermal absorption for *p*-dichlorobenzene as a surrogate for *o*-dichlorobenzene, and used probabilistic modeling considering the distribution of surface area (up to 2 hands) and a range of empirically-derived loading doses (0.7–2.1 mg/cm^2), along with a fraction absorbed based on empirical data received in response to test orders (either 2% or 4% absorption, depending on the weight fraction of *o*-dichlorobenzene in the product). The test order data indicated that higher weight fraction formulations (*e.g.*, neat) at lower loading resulted in 4% dermal absorption, while lower weight fractions tested (40–50%, 10%, 1%) supported a dermal absorption of 2%.

As described in Sections 4.1.1.2 and 4.1.1.3, EPA has moderate confidence in the dermal exposure assessments, which were based on test order data on dermal absorption for *p*-dichlorobenzene as a surrogate for *o*-dichlorobenzene, and used probabilistic modeling considering the distribution of surface area (up to 2 hands) and a range of empirically-derived loading doses. For the Processing – Repackaging COU, though operations are mostly performed in a closed system, worker activities like connecting and disconnecting hoses present an opportunity for dermal exposure to workers' hands.

6.1.3.2 Impact of Non-Detects on Inhalation Exposure Estimates

The high proportion of inhalation monitoring samples below the LOD for certain COUs adds uncertainty regarding the precise concentration of *o*-dichlorobenzene that workers are exposed to in these facilities. Therefore, it was important for EPA to closely examine the impact of this uncertainty on the precision and confidence in the inhalation exposure and risk estimates for each of these COUs to determine whether the COU significantly contributes to unreasonable risk (discussed for each COU below). Three COUs in particular had a high proportion of ND in the inhalation monitoring dataset, including (1) Commercial use – Ink, toner, and colorant products – Ink and toners; (2) Processing – As a reactant; and (3) Processing – Incorporation into formulation, mixture or reaction product – Intermediates in all other basic organic chemical manufacturing. Each COU is discussed below.

6.1.3.3 Supporting Evidence for Each of the COUs That Significantly Contribute to Unreasonable Risk to Workers

Supporting evidence for each of the COUs that significantly contribute to unreasonable risk to workers is summarized below, with further details on the risk characterization provided in Section 4.3.2. Confidence in the human health hazard values is robust, as described in Table 4-11, and confidence in the exposure estimates for each COU is included in Table 4-5. Resulting confidence in the risk estimates is described for each COU below.

Two COUs Associated with the Repackaging OES

For the two COUs associated with the Repackaging OES (*i.e.*, Manufacturing – Import; Processing – Repackaging), EPA's preliminary determination on unreasonable risk is based on PBZ monitoring data from one facility where repackaging activities occur, described in more detail in Section 1.1.1.1.1 "Repackaging." The preliminary determination of unreasonable risk to workers for this COU is driven by non-cancer inhalation risks at high-end exposures for workers for both identified SEGs (Polymer Chemical Operators and Copolymer Chemical Operators) and high-end dermal exposures. Risk estimates for central tendency exposure were at or above benchmark. The worker inhalation exposure estimates are based on test order inhalation data, of which 15 8-hour samples, along with 2 additional occupational task-based personal air samples, had associated task descriptions of "Connect/disconnect transfer hoses to intermodal containers" that were deemed by EPA to be relevant to repackaging activities. The Agency has robust confidence that these risk estimates represent actual 8-hour exposure for workers performing these tasks, given that the PBZ samples are 8-hour samples from workers performing the operations of connecting and disconnecting transfer hoses, and therefore account for the proportion of the workday in which these tasks are performed.

EPA preliminarily determined that high-end inhalation exposure to workers significantly contributes to unreasonable risk for the Manufacturing – Import and Processing – Repackaging COUs, given that 14 of 15 measurements for the Repackaging OES were above the LOD. High-end exposure to Polymer Chemical Operators was based on the 95th percentile exposure values from eight samples (all above the LOD), resulting in a risk estimate below the benchmark (MOE = 5.7), and high-end exposure to Copolymer Chemical Operators included the single non-detect (ND) sample at one-half of the LOD and taking the 95th percentile of that value along with the five detected values resulted in a risk estimate below the benchmark (MOE = 6.4). No information was provided regarding respirator use. Therefore, for these COUs, the draft risk determination is based on risk estimates that do not reflect use of PPE for respiratory protection.

EPA has preliminarily determined that ONU exposure does not significantly contribute to the unreasonable risk, given that the single PBZ inhalation sample for ONUs was above the LOD and resulted in a risk estimate above the benchmark (MOE = 69).

EPA has also preliminarily determined that high-end dermal exposure to workers significantly contributes to the unreasonable risk (MOE = 14). As described in Section 4.1.1.3, EPA has moderate confidence that both central tendency and high-end estimates of dermal exposure reflect the actual distribution of worker dermal exposure given that these estimates are based on the 50th and 95th percentile from probabilistic modeling using test order data on dermal absorption for *p*-dichlorobenzene as a surrogate for *o*-dichlorobenzene and considering the distribution of surface area (up to 2 hands) and a range of empirically-derived loading doses and the fraction absorbed (either 2% or 4% based on test order data). PPE documented in the test order report indicates that Polymer/copolymer operators used neoprene gloves and that task-specific PPE may include leather gloves. However, EPA found no data on whether this PPE applies at repackaging sites. While the Agency acknowledges that proper selection and use of gloves can reduce dermal exposure and risk, given the uncertainty regarding glove use, the draft risk determination for these COUs is based on risk estimates that do not reflect use of PPE. Further details on the use of PPE relevant to Repackaging can be found in Table 4-14.

Two COUs Associated with Processing as a Reactant OES

For the two COUs associated with the Processing as a Reactant OES (*i.e.*, Processing – As a reactant; Processing – Incorporation into formulation, mixture or reaction product – Intermediates in all other basic organic chemical manufacturing), EPA's preliminary determination of unreasonable risk to workers is based on surrogate PBZ monitoring data of *p*-dichlorobenzene from two processing facilities and driven by non-cancer inhalation risks at high-end exposures for workers for the Material Handlers SEG and high-end dermal exposure to average adult workers. The worker inhalation exposure estimates for this COU are based on surrogate monitoring data of *p*-dichlorobenzene from two processing facilities, and correcting for differences in vapor pressure between the two isomers to estimate exposure to *o*-dichlorobenzene. *p*-Dichlorobenzene is a suitable surrogate for *o*-dichlorobenzene given the similarities in structure (isomers) and physical and chemical properties (*e.g.*, both with a vapor pressure of ≈1 mm Hg). Also, *o*-dichlorobenzene is expected to be present at concentrations similar to *p*-

dichlorobenzene during exposure scenarios relevant to this COU because both isomers are handled under highly similar industrial conditions.

Although *p*-dichlorobenzene is a solid at atmospheric conditions, it is melted and transferred as a liquid during processing, like *o*-dichlorobenzene. Both chemicals require comparable corrosion-resistant equipment, vapor control systems, and thermal separation operations due to their similar volatility, low flash points, and corrosive processing environments. Because both chemicals are processed in similar enclosed systems and begin at relatively high concentrations, fugitive and stack releases, as well as potential worker exposures, are expected to be comparable. For Material Handlers, the median and maximum of the five samples were used to represent a central tendency and high-end estimate, respectively, and the resulting risk estimates were below the benchmark for both central tendency (MOE = 29) and high-end (MOE = 1.4). EPA has moderate-to-robust confidence in these risk estimates, as all five samples were above the LOD. However, despite the appropriateness of using *p*-dichlorobenzene as a surrogate for *o*-dichlorobenzene exposure, the Agency does not consider the inhalation exposures at central tendency to significantly contribute to unreasonable risk, because the risk estimate is marginally below the benchmark (MOE = 29) and when taking into account the uncertainty given these data are based on measurements of *p*-dichlorobenzene instead of *o*-dichlorobenzene.

Risk estimates were below the benchmark at both central tendency and high-end for Lab Technicians and ONUs. Again, the fact that all inhalation monitoring samples for lab technicians and ONUs were below the LOD adds uncertainty regarding the precise concentration of *o*-dichlorobenzene that these workers are exposed to in these facilities. In cases in which all of the inhalation monitoring samples are below the LOD, EPA considers the best estimation of exposure to be determined by the substitution method (*e.g.*, ½ LOD), and therefore considers this estimate (*e.g.*, central tendency) to be more representative than high-end (*e.g.*, upper bound based on the LOD). Furthermore, for ONU exposure, given that many of the inhalation samples for workers were below the LOD and ONU exposure would be expected to be lower than worker exposure, the use of central tendency is considered representative when exposure values are comprised exclusively of non-detects (NDs). The risk estimates for the Laboratory Technician SEG based on central tendency exposure (*e.g.*, ½ LOD) was below the benchmark (MOE = 15); however, EPA is not confident that these risk estimates represent actual risk given the data were comprised entirely of NDs and the risk estimate may merely be an artifact of a relatively low hazard and an insensitive LOD for exposure. Therefore, EPA identified surrogate inhalation monitoring data from another chemical, 1,1,2-trichloroethane, which had a dataset comprised predominately of detected values (22 samples with 8 NDs) and had a much more sensitive LOD, which imparts greater confidence in the data for determining risk.

The exposure estimate when using the 1,1,2-trichloroethane, based primarily on detected values, (1.3×10^{-5} ppm) was orders of magnitude lower than the central tendency exposure estimate when using *p*-dichlorobenzene, resulting in a risk estimate when using 1,1,2-trichloroethane that was orders of magnitude above the benchmark (MOE = 3.5×10^4). Even at high-end, exposure to laboratory technicians when using 1,1,2-trichloroethane (5.4×10^{-4}) was two orders of magnitude lower than when using *p*-dichlorobenzene, resulting in a risk estimate well above the benchmark (MOE = 832). Therefore, EPA has preliminarily determined that inhalation exposure to Laboratory Technicians SEG does not significantly contribute to the unreasonable risk. Similarly, inhalation exposure to ONUs does not significantly contribute to the unreasonable risk given both that the risk estimate at central tendency is marginally below the benchmark (MOE = 28) and when considering the uncertainty as these data are based on measurements of *p*-dichlorobenzene instead of *o*-dichlorobenzene. No information was provided regarding respirator use; therefore, the draft risk determination is based on risk estimates that do not reflect use of PPE for respiratory protection.

EPA has preliminarily determined that high-end dermal exposure to workers significantly contributes to the unreasonable risk (MOE = 14). EPA preliminarily determined that high-end dermal exposure to workers significantly contributes to the unreasonable risk (MOE = 14). As described in Section 4.1.1.3, the Agency has moderate confidence that both central tendency and high-end estimates of dermal exposure reflect the actual distribution of worker dermal exposure. This is because these estimates are based on the 50th and 95th percentile from probabilistic modeling using test order data on dermal absorption for *p*-dichlorobenzene as a surrogate for *o*-dichlorobenzene, considering the distribution of surface area (up to 2 hands) and a range of empirically-derived loading doses and the fraction absorbed (either 2% or 4% based on test order data).

Typical PPE for each SEG relevant to the Processing as a Reactant COU were provided in the report by ACC for the surrogate *p*-dichlorobenzene, which stated that all workers (including Material Handlers, Process Field Operators, and Laboratory Technicians) wore chemical-resistant gloves with specific application training. However, EPA has no specific information on gloves (*e.g.*, material composition, thickness, frequency/duration of use, or efficacy). While the Agency acknowledges that proper selection and use of gloves can reduce dermal exposure and risk, given the uncertainty regarding the protection provided by glove use for this COU, and considering the risk estimates for high-end dermal exposure were below the benchmark (MOE = 14), the draft risk determination for these COUs is based on risk estimates that do not reflect use of PPE. Although EPA has test order data, the Agency is seeking public comment on whether and how exposure controls and personal protective equipment (PPE) are used by workers during exposure scenarios that comprise these two COUs: Processing – As a reactant; Processing – Incorporation into formulation, mixture or reaction product – Intermediates in all other basic organic chemical manufacturing. Further details on the use of PPE relevant to Processing as a Reactant can be found in Table 4-14.

One COU Associated with the Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing OES

For the Processing – Incorporation into formulation, mixture or reaction product – Soap, cleaning compound, and toilet preparation manufacturing COU, EPA's preliminary determination of unreasonable risk to workers is driven by non-cancer inhalation risks at central tendency and high-end exposures and high-end dermal exposure to workers. In absence of data specific to ONU exposure, EPA assumed that worker central tendency exposure was representative of ONU exposures and the basis for the ONU unreasonable risk. The inhalation risk is based on data from OSHA's CEHD database (OSHA, 2019) and included five full-shift PBZ samples taken in May 1994 from one site under the SIC code 2842 – Specialty Cleaning, Polishing, and Sanitations Preparations. EPA calculated the 50th percentile for central tendency and maximum 8-hour TWA concentrations for high-end worker exposure and considered worker central tendency exposure as representative of ONU exposures. Risk estimates were below the benchmark for central tendency (MOE = 4.8) worker and ONU exposure as well as high-end worker exposures (MOE = 1.2); thus, EPA has moderate-to-robust confidence in the risk estimates for workers given that all five samples were above the LOD and represent actual workplace *o*-dichlorobenzene exposures at facilities conducting activities consistent with this COU description. EPA has lower confidence in the risk estimates for ONUs (*e.g.,* moderate), given that there was no ONU-specific monitoring, so EPA estimated ONU exposure using worker central-tendency.

EPA has preliminarily determined that high-end dermal exposure to workers significantly contributes to the unreasonable risk (MOE = 14). As described in Section 4.1.1.3, EPA has moderate confidence that both central tendency and high-end estimates of dermal exposure reflect the actual distribution of worker dermal exposure, given that these estimates are based on the 50th and 95th percentile from probabilistic modeling using test order data on dermal absorption for *p*-dichlorobenzene as a surrogate for *o*-dichlorobenzene, considering the distribution of surface area (up to 2 hands) and a range of empirically-derived loading doses and the fraction absorbed (either 2% or 4% based on test order data).

No information was available describing engineering controls or documented PPE use for this exposure scenario.

One COU Associated with the Incorporation into Formulation, Mixture, or Reaction Product OES

For the Processing – Incorporation into formulation, mixture or reaction product – Solvents (which become part of product formulation or mixture) COU, EPA's preliminary determination of unreasonable risk is driven by non-cancer inhalation risks at central tendency and high-end exposures to workers and exposures to ONUs based on six sets of *o*-dichlorobenzene inhalation monitoring data. The Dow Chemical (1984) study included 5 of these datasets comprising 79 PBZ samples among 5 SEGs reporting the following ranges: (1) Badger Operator (ND–0.18 ppm); (2) Chlorinator Operator (0.05–0.11 ppm); (3) Tri-Tetrachlor Operator (ND–0.17 ppm); (4) Still Operator (0.85–5.7 ppm), and (5) Chlorobenzol Operator (ND–0.06 ppm). The remaining dataset was from the study by Kumagai and Matsunaga (1997) (cited in (IARC, 1999)), which presented 28 PBZ samples (8-hour TWA) for 10 workers collected at a plant that synthesized intermediate products for dyes. The measured *o*-dichlorobenzene concentrations ranged between 0.1 to 2.3 ppm (only the minimum and maximum values were provided). EPA took the median of the low- and high-ends of these six ranges as an estimate of central tendency exposure, using half the LOD (0.025 ppm) for non-detect when ND represented the low-end of the range. For the high-end, the Agency took the 95th percentile of the six data points representing the upper-ends of the ranges. EPA has preliminarily determinined that inhalation risk to workers at central tendency and ONUs significantly contribute to unreasonable risk, given that four of six data ranges had values at low-end of range above LOD. For this reason, EPA included NDs at half the LOD and the resulting risk estimate is below benchmark (MOE = 6).

EPA has moderate confidence in inhalation risk to workers for high-end exposures, given this reflects 95th percentile of the upper ends of ranges across the six datasets, all above LOD, and resulting in a risk estimate well below the benchmark (MOE = 0.14). The Agency has lower confidence in the risk estimates for ONUs (*e.g.,* slight-to-moderate) given that there was no ONU-specific monitoring, therefore EPA estimated ONU exposure using worker central tendency. No information was available describing engineering controls or documented PPE use for this exposure scenario.

Note, two other OESs are mapped to this COU (*i.e.*, Plastic Compounding and Plastic Converting). EPA has preliminarily determined that exposures from plastic compounding and converting of *o*-dichlorobenzene are negligible and human health risks are unlikely from these uses. As stated in Section 4.3.2, monitoring data for plastic compounding and plastic converting are from one facility that uses PPS resin, which is manufactured by processing *p*-dichlorobenzene as a reactant. *p*-Dichlorobenzene is expected to be present in the resin that enters the compounding facility at less than 100 ppm. Therefore, though there is insufficient information available for quantifying air concentrations and dermal exposure estimates for *o*-dichlorobenzene, exposures are expected to be lower than they would be for *p*-dichlorobenzene, for which not a single measurement was detected above the LOD. (The LOD was 0.026 ppm for workers and ranged from 0.0041–0.03 ppm for ONUs.) EPA applied exposure estimates for *p*-dichlorobenzene by assessing the maximum LOD as the high-end exposure and half the maximum LOD as the central tendency exposure concentrations for each SEG, according to *Guidelines for Statistical Analysis of Occupational Exposure Data* (accessed August 5, 2026). Even with these health-protective assumptions, the *Draft Risk Evaluation for p-Dichlorobenzene* did not identify indication of unreasonable risk to *p*-dichlorobenzene from plastic compounding or plastic converting of *p*-dichlorobenzene. Therefore, EPA has determined that exposures from plastic compounding and converting of *o*-dichlorobenzene are negligible and human health risks are unlikely. Data regarding PPE use provided by the ACC Consortium for the surrogate *p*-dichlorobenzene indicates glove use by extrusion operators. However, no further details were available regarding glove material, thickness, frequency or duration of use, or efficacy. No information was provided regarding respirator use during plastics compounding and plastics converting. EPA did not identify data indicating whether similar PPE would be used at sites using *o*-dichlorobenzene in plastic compounding or plastic converting operations. No information was available describing engineering controls or documented PPE use for this exposure scenario.

One COU Associated with the Functional Fluids (Closed System) OES

For the Industrial use – Functional fluids (closed system) – All other basic organic chemical manufacturing COU, EPA's preliminary determination of unreasonable risk to workers is driven by non-cancer inhalation risks and dermal risks to workers at the high-end. For the inhalation exposure estimates, this COU used the same test order data as the Repackaging COU, in which 15 full-shift (8 hours) PBZ samples and the 2 task-based samples had associated task descriptions containing "Connect/disconnect transfer hoses to intermodal containers" considered to be relevant to activities associated with the use of functional fluids and included under this COU (SABIC, 2024). The TWA data were split between two SEGs: average adult workers and ONUs. For 8-hour TWA concentrations for average adult workers, there were 15 samples, with only a single ND. As described in Section 4.1.1, for datasets including exposure data that were reported as below the limit of detection (LOD), EPA estimated the exposure concentrations following the *Guidelines for Statistical Analysis of Occupational Exposure Data* (U.S. EPA, 1994), which recommends using the $\frac{LOD}{\sqrt{2}}$ if the geometric standard deviation of the data is less than 3.0 and $\frac{LOD}{2}$ if the geometric standard deviation is 3.0 or greater. High-end exposure to workers included the single ND sample at ½ LOD and taking the 95th percentile of that value along with the 14 detected values resulted in a risk estimate below the benchmark (MOE = 4.9).

EPA has robust confidence in this risk estimate, given it is (1) based on recent full-shift PBZ inhalation monitoring data generated in response to test orders; (2) the specific tasks the workers were performing are relevant to this COU; (3) 14 of the 15 samples were above the LOD; and (4) the resulting risk estimates were well below the benchmark. No information was provided regarding respirator use; therefore, the draft risk determination for these COUs is based on risk estimates that do not reflect use of PPE for respiratory protection.

EPA preliminarily determined that worker exposure at central tendency and ONU exposure do not significantly contribute to the unreasonable risk. Worker central tendency exposure included the single ND sample at ½ LOD, and taking the 50th percentile of that value along with the 14 detected values resulted in a risk estimate above the benchmark (MOE = 64). EPA estimated ONU exposure as equivalent to central tendency worker exposure. Therefore, the Agency has lower confidence in the risk estimates for ONUs (*e.g.,* moderate-to-robust) given that there was no ONU-specific monitoring.

EPA preliminarily determined that high-end dermal exposure to workers significantly contributes to the unreasonable risk (MOE = 17). As described in Section 4.1.1.3, the Agency has moderate confidence that both central tendency and high-end estimates of dermal exposure reflect the actual distribution of worker dermal exposure, given that these estimates are based on the 50th and 95th percentile from probabilistic modeling using test order data on dermal absorption for *p*-dichlorobenzene as a surrogate for *o*-dichlorobenzene, and considering the distribution of surface area (up to 2 hands) and a range of empirically-derived loading doses and the fraction absorbed (either 2% or 4% based on test order data).

PPE documented in the test order report indicates that Polymer/Copolymer Operators used neoprene gloves and that task-specific PPE may include leather gloves. However, EPA found no data on whether this PPE applies at sites using *o*-dichlorobenzene as a functional fluid. Although EPA acknowledges that proper selection and use of gloves can reduce dermal exposure and risk—given the uncertainty regarding the protection provided by glove use for this COU and considering the risk estimates for high-end dermal exposure were below the benchmark (MOE = 17)—the draft risk determination for these COUs is based on risk estimates that do not reflect use of PPE. While the Agency has test order data, EPA is seeking public comment on whether and how exposure controls and PPE are used by workers in exposure scenarios associated with Industrial use – Functional fluids (closed system) – All other basic organic chemical manufacturing COU. Further details on the use of PPE relevant to Functional fluids (closed systems) COU can be found in Table 4-14.

Three COUs Associated with the Industrial Use of Solvents OES

For the three COUs associated with the Industrial Use of Solvents OES—(1) Processing – Recycling; (2) Industrial use – Solvents (which become part of product formulation or mixture) – Printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing; and (3) Industrial use – Non-incorporative activities – Processing aids, not otherwise listed—EPA's preliminary determination of unreasonable risk to workers is driven by non-cancer inhalation risks to all worker SEGs and ONUs and dermal risks at the high-end. The preliminary determination is based on inhalation risk derived from test order exposure data comprised of 28 full-shift (8-hour) PBZ samples, along with 2 occupational task-based PBZ samples. The Agency has robust confidence in inhalation risk at high-end for all of the SEGs, given that (1) all measurements were above the LOD for Polymer Chemical Operators resulting in a risk estimate below the benchmark (MOE = 6.0), and (2) the majority of measurements (71–83%) were above the LOD for each of the other SEGs. Including ND values at LOD divided by two and taking the 95th percentile of those values along with the detected values resulted in MOEs below the benchmark (MOE = 6.4–12).

EPA has preliminarily determined that high-end dermal exposure to workers significantly contributes to the unreasonable risk (MOE = 13). As described in Section 4.1.1.3, EPA has moderate confidence that both central tendency and high-end estimates of dermal exposure reflect the actual distribution of worker dermal exposure, given that these estimates are based on the 50th and 95th percentile from probabilistic modeling using test order data on dermal absorption for *p*-dichlorobenzene as a surrogate for *o*-dichlorobenzene, considering the distribution of surface area (up to 2 hands) and a range of empirically-derived loading doses and the fraction absorbed (either 2% or 4% based on test order data).

The WeylChem Test Order report indicated that the highest exposure task workers wore a full-face organic vapor cartridge respirator. In contrast, no information was provided regarding respirator use in the SABIC Test Order report, which indicated that Polymer/Copolymer Operators used neoprene gloves and that task-specific PPE may include leather gloves. However, EPA found no data on whether this PPE applies at sites using *o*-dichlorobenzene as an industrial solvent. Therefore, EPA did not incorporate PPE use into the determination of unreasonable risk. Although EPA has test order data, EPA is seeking public comment on whether and how exposure controls and PPE are used by workers under these three COUs associated with the Industrial Use of Solvents OES. Further details on the use of PPE relevant to industrial use of solvents can be found in Table 4-14. Additionally, as described in Section 3.1.1, EPA mapped OESs to COUs based on information gathered during systematic review, test orders collected under TSCA section 4, industry outreach, and public comments. The Agency is seeking additional comments on the application (*i.e.,* mapping) of the Industrial Use of Solvents OES to these three COUs in the event that additional information may further refine EPA's exposure analysis for these COUs. Mapping between the COUs and OES assessed for *o*-dichlorobenzene is provided in Table 3-1.

One COU Associated with the Use of Ink, Toner, and Colorant Products OES

For the Commercial use – Ink, toner, and colorant products – Ink and toners COU, EPA's preliminary determination of unreasonable risk to workers is driven by non-cancer inhalation risks at the high-end. Worker inhalation exposure is based on occupational inhalation data for *o*-dichlorobenzene during use of ink, toner, and colorant products in OSHA's CEHD database (OSHA, 2019). EPA estimated inhalation exposures using 23 partial-shift PBZ samples (22 NDs) that equated to 5 full-shift TWA samples (total sample durations 378–447 minutes) taken in 1992 from 1 site. LODs ranged from 0.01 to 0.04 ppm for 22 non-detect partial-shift samples. For each of the 22 non-detect partial-shift samples, EPA used the substitution method, dividing the LOD by 2 to obtain an estimate for each of the partial-shift samples below the LOD. EPA then calculated a TWA for the four full-shift samples associated with the same worker and day. High-end was maximum (when a dataset has 2–5 samples, the maximum value is used as high-end) and central tendency was 50th percentile (median) of calculated TWA concentrations, which includes non-detects at LOD/2. One of four full-shift samples was above the LOD.

EPA considers the high-end exposure estimate to reflect actual exposure to workers in the ink, toner, and colorant products industry, given that this exposure is based on monitoring data relevant to this COU and the single sample measured at 0.50 ppm is higher than the POD of 0.45 ppm, resulting in MOE of 18. EPA has preliminarily determined that high-end inhalation exposures associated with commercial use of inks and toners significantly contribute to unreasonable risk. However, the Agency has slight-to-moderate confidence in this risk estimate given that a single sample is driving risk, EPA is therefore seeking input on this draft risk evaluation for any more recent or additional inhalation monitoring data to inform occupational inhalation exposure to workers for this COU. The Agency assumed that worker central tendency exposure was representative of ONU exposures. EPA has preliminarily determined that ONUs and workers experiencing *o*-dichlorobenzene inhalation exposures at central tendency do not significantly contribute to unreasonable risk given the risk estimates well above the benchmark (MOE = 80). Similarly, EPA has preliminarily determined that dermal exposure to *o*-dichlorobenzene does not contribute to unreasonable risk.

No information was available describing engineering controls or documented PPE use for this exposure scenario.

One COU Associated with the Use of Paints and Coatings OES

For the Commercial use – Paints and coatings – Coatings and paints, thinners, paint removers COU, EPA's preliminary determination of unreasonable risk is driven by non-cancer inhalation risks to workers at central tendency and high-end exposures as well as ONUs at central tendency exposures. Inhalation exposure was determined from modeling using the Automotive Refinishing Spray Coating Mist Inhalation Model (OECD, 2011a). The Agency took the 50th and 95th percentile mist concentration from the model along with the concentration of *o*-dichlorobenzene in the paint (a median of 10% for central tendency and a maximum of 50% for high-end, based on the identified products) to estimate the central tendency and high-end inhalation exposures, respectively. In absence of data specific to ONU exposure, EPA assumed that worker central tendency exposure was representative of ONU exposures. Although most worker exposures to *o*-dichlorobenzene through spray application of paints and coatings are expected to be closer to the central tendency exposure, a confluence of a subset of variables (*e.g.,* low ventilation, high-pressure spray, etc.) could result in high-end exposures that are considered plausible and expected for an acute exposure duration. Therefore, EPA has preliminarily determined that this COU significantly contributes to unreasonable risk to workers and ONUs. Although the Agency is moderately confident that the modeled exposure estimates comprising high-end exposures are representative of actual worker exposure from the use of paints and coatings, it is seeking comment on this modeling approach, and specifically the values for the variables that contribute to high-end exposures, in this draft risk evaluation to consider for the final risk evaluation for *o*-dichlorobenzene. EPA estimated ONU exposure as equivalent to central tendency worker exposure; therefore, the Agency has lower confidence in the risk estimates for ONUs (*e.g.,* slight-to-moderate) given that there was no ONU-specific modeled data available.

Note that there was an additional OES mapped to this COU (*i.e.*, Use of paint thinners and removers) that does not drive the unreasonable risk under this COU (MOEs = 130–527) and for which EPA has moderate confidence in the risk estimate.

EPA did not identify information to the extent to which engineering controls and worker PPE are used at facilities that use *o*-dichlorobenzene-containing paints and coatings.

One COU Associated with the Use of Lubricants and Greases OES

For the Commercial use – Lubricants and greases COU, EPA's preliminary determination of unreasonable risk to workers is driven by non-cancer inhalation risks at the high-end of exposure but not central tendency exposure to workers or ONUs. The Agency relied on the 2020 ESD on Chemical Additives in Automotive Lubricants and Monte Carlo modeling to estimate worker inhalation exposure (OECD, 2020). The Agency used vapor generation rate and exposure duration parameters from the 1991 CEB Manual (CEB, 1991) and EPA's Mass Balance Inhalation Model to model the exposure points described in the ESD—particularly for the unloading and cleaning of containers. The high-end values represent the 95th percentile and the central tendency values represent the 50th percentile of the simulation outputs. High-end inhalation exposures for the Use of lubricants and greases COU from the empirically-informed modeling are associated with elevated levels of *o*-dichlorobenzene from factors such as low ventilation, high concentration, and high use rate. Although EPA lacks *o*-dichlorobenzene-specific monitoring data for this COU, the Agency considers the high-end scenario driving unreasonable risk to be relevant for an acute exposure.

As explained in Section 4.3.2, EPA has determined that only the evaluation of acute risks are necessary because the same critical health effects of respiratory toxicity and liver toxicity demonstrate the same or decreasing severity over time and the same hazard values for each apply to all exposure durations. Continued exposure functions as repeated acute risk instead of an accumulation of increasing chronic risk, and acute risk estimates would be protective of any intermediate or chronic exposures. Therefore, only acute risk estimates were presented in this draft risk evaluation. In absence of data specific to ONU exposure, EPA assumed that worker central tendency exposure was representative of ONU exposures. The Agency has moderate confidence in these exposure and risk estimates. EPA has preliminarily determined that the Commercial use of lubricants and greases COU significantly contributes to unreasonable risk from to workers from high-end inhalation exposure based on the risk estimate being below the benchmark (MOE = 19). EPA has preliminarily determinined that the unreasonable risk is not driven by risk to workers from central tendency exposures or risk to ONUs from Commercial use of lubricants and greases.

EPA did not find information to the extent to which engineering controls and worker PPE are used at facilities using *o*-dichlorobenzene in lubricants and greases.

One COU Associated with the Use of Cleaning and Furnishing Care Products and Use of Other Cleaning Products OESs (Dry Cleaning and Septic Tank Cleaning Scenarios)

For the Commercial use – Other use – Laboratory chemicals; Cleaning and furnishing care products COU, EPA's preliminary determination of unreasonable risk to workers is driven by non-cancer inhalation risks from two OESs: Use of Cleaning and Furnishing Care Products; and Use of Other Cleaning Products (represented by septic tank cleaners). EPA has moderate-to-robust confidence in the exposure and risk estimates for another OES associated with this COU—the Use of Laboratory Chemicals. The Agency has preliminarily determined that the Use of Laboratory Chemicals OES significantly contributes to the unreasonable risk for this COU from dermal exposure.

EPA relied on occupational inhalation data for *o*-dichlorobenzene in OSHA's CEHD database (OSHA, 2019) based on two PBZ samples taken in March 1995 from one site under the SIC code 7216 – Drycleaning Plants, Except Rug Cleaning. Both samples were from the same facility, date, and shared the same sample number in the CEHD database, and thus were assumed to be two halves of a single full-shift sample. As EPA estimated inhalation exposures using this one PBZ sample, EPA was unable to estimate a range of potential exposures during this scenario and presents only one concentration. Although EPA also did not generate estimates of ONU exposure, the Agency assumes that ONU exposures would be equal to or less than estimated worker exposures.

Because only one data point was found relevant to this OES, EPA also used surrogate data to estimate exposure using information from a generic scenario, Chemicals Used in Furnishing Cleaning Products (U.S. EPA, 2022). This GS presents monitoring data from a study that measured air concentrations of volatile hydrocarbon substances during the use of various general cleaning products. Further details are described in Section 4.3.2. The central tendency of the volatile organic samples from different cleaning scenarios closely aligns with the single sample from the dry cleaning industry (0.17 ppm 8-hour TWA from the surrogate data, compared to 0.15 ppm from the dry cleaning industry), bolstering confidence in this exposure estimate from slight-to-moderate confidence to moderate confidence. The high-end exposure obtained using the surrogate data from the generic scenario is an order of magnitude higher than the central tendency results (1.6 ppm 8-hour TWA). EPA does not have data to make a (preliminary) determination of risk to ONUs from this COU. Based upon the close alignment between these different lines of evidence, EPA considers this COU to significantly contribute to unreasonable risk to workers from inhalation of *o*-dichlorobenzene.

EPA evaluated another OES (Use of Other Cleaning Products OES) for this COU, represented by septic tank cleaners. For septic tank cleaners, the Agency used CEM to model inhalation exposure to workers by adjusting inputs specific for a worker scenario as described in Section 4.1.1.1. EPA used a commercially available plumbing line cleaner/deodorizer containing 99% *o*-dichlorobenzene (Utility Wonder Products, 2014) for the model inputs for weight fraction (0.99) and mass per use (582 g). The Agency assumed 5 minutes per use, based on the time it takes a worker to pour the product into a toilet and flush, with this application occurring 8 times per day, and 250 days per year for chronic exposure. EPA also conducted a bounding estimate based on commercial assumptions, where a worker may only use the product once a day, instead of 8 times, with all other inputs constant. In Table 4-2, one use is labeled as low-end and 8-times per day use is labeled as high-end. Resulting risk estimates were below the benchmark at both the low-end (MOE = 9.3×10^{-2}) and high-end (MOE = 1.2×10^{-2}). EPA concludes that both the low-end and high-end are reasonable scenarios and supportive of EPA's preliminary determination of unreasonable risk under this COU. The Agency has robust overall confidence for modeling this COU inhalation exposure, given the reported weight fraction and amount of use. The weight fraction was reported though the SDS and amount used was based on reported directions. Although there is uncertainty in the duration of use as there were no values identified in the EFH (U.S.

EPA, 2011a) for this product, EPA has confidence that the user does not take long to flush the product down the toilet after pouring.

Based upon the close alignment between these different lines of evidence, including the inhalation monitoring sample from the drycleaning industry and the monitoring concentrations of volatile hydrocarbons from the use of various cleaning products, in addition to the risk associated with the septic tank cleaner OES associated with this COU, EPA has moderate confidence in the exposure and risk estimates. Therefore, the Agency considers this COU to significantly contribute to unreasonable risk to workers from inhalation of *o*-dichlorobenzene. Additionally, EPA preliminarily determined that high-end dermal exposure to workers significantly contributes to the unreasonable risk, given the risk estimates for both the Cleaning and furnishing care products OES (MOEs = 14–15) and the Use of Laboratory Chemicals OES (MOE = 19). As described in Section 4.1.1.3, EPA has moderate confidence that both central tendency and high-end estimates of dermal exposure reflect the actual distribution of worker dermal exposure, given that these estimates are based on the 50th and 95th percentile from probabilistic modeling using test order data on dermal absorption for *p*-dichlorobenzene as a surrogate for *o*-dichlorobenzene, considering the distribution of surface area (up to 2 hands) and a range of empirically-derived loading doses and the fraction absorbed (either 2% or 4% based on test order data).

EPA did not find information to the extent to which engineering controls and worker PPE are used at facilities using *o*-dichlorobenzene in cleaning and furnishing care products. For the Use of Laboratory Chemicals OES, test order information was provided for 1,1,2-trichloroethane as a surrogate that indicated that laboratory technicians wore nitrile gloves. However, EPA did not identify data indicating whether similar PPE would be worn for *o*-dichlorobenzene use as a laboratory chemical (Table 4-14). Therefore, EPA is seeking public comment on whether and how exposure controls and PPE are used by workers in exposure scenarios associated with Commercial use – Other use – Laboratory chemicals; Cleaning and furnishing care products COU.

6.1.3.4 COUs That Do Not Significantly Contribute to the Unreasonable Risk to Workers

EPA has preliminarily determined that the following five (5) COUs do *not* significantly contribute to unreasonable risk to workers or ONUs from inhalation or dermal exposure:

- Manufacture – Domestic manufacture;
- Disposal;
- Distribution in commerce;
- Commercial use – Fuels and related products – Fuel additive; and
- Commercial use – Air care products – Continuous action air fresheners.

Manufacturing

The Manufacture – Domestic manufacture COU used surrogate information for the isomer *p*-dichlorobenzene received as part of inhalation test order data from a facility which manufactures *p*-dichlorobenzene and a mixture of other isomers as a byproduct of their VCM Per-Tri production process. *o*-Dichlorobenzene is unintentionally manufactured as a byproduct during the production of VCM. It may also be produced when manufacturing herbicides, 3,4-dichloroaniline, and isocyanates used to make polyurethane. Data from the manufacturing process of VCM was considered when conducting this assessment, and it is assumed to be representative of all cases when *o*-dichlorobenzene is manufactured as a byproduct. Note that the Import COU is covered in the Repackaging OES, discussed below. Preliminary review of 2024 CDR data indicates that *o*-dichlorobenzene has also been domestically manufactured as a primary product in recent years; EPA intends to incorporate 2024 CDR data and other reasonably available information regarding domestic manufacture of *o*-dichlorobenzene into the final risk evaluation.

As explained in Section 4.3.2.1, air concentrations of *o*-dichlorobenzene are expected to be lower than they would be for *p*-dichlorobenzene, for which not a single measurement was detected above the LOD and for which EPA has preliminarily determined did not significantly contribute to unreasonable risk. Therefore, the Agency has preliminarily determined that exposures from manufacturing of *o*-dichlorobenzene as a byproduct are negligible and human health risks are unlikely. EPA has moderate-to-robust confidence in this qualitative assessment of exposure and risk for the Domestic manufacture COU.

Furthermore, PPE documentation at the Westlake Corporation facility indicates that all workers use nitrile gloves and have an escape respirator available. Additional information on respiratory protection indicated the following: Shipping Tankerman use a full-face respirator or a half-mask respirator and that select Per-Tri and VCM unit operators use a half-face respirator, with one Per-TRI unit maintenance employee using supplied air/SCBA. Therefore, EPA considered qualitatively that any respirator use would further reduce the already negligible inhalation exposures from manufacturing of *o*-dichlorobenzene as a byproduct. Additional details on the use of PPE relevant to Domestic manufacture can be found in Table 4-14.

Data regarding PPE use provided by the ACC Consortium for the surrogate *p*-dichlorobenzene indicates glove use by extrusion operators. However, no further details were available regarding glove material, thickness, frequency or duration of use, or efficacy. No information was provided regarding respirator use. EPA did not identify data indicating whether similar PPE would be used at sites using *o*-dichlorobenzene in plastic compounding or plastic converting operations. Further details can be found in Table 4-14.

Disposal

As described in Section 4.3.2, the worker inhalation exposure estimates for this COU are based on surrogate monitoring data from *p*-dichlorobenzene. These data have been corrected based on differences in vapor pressure to estimate exposure estimates for *o*-dichlorobenzene, with *p*-dichlorobenzene considered to be a suitable surrogate for *o*-dichlorobenzene, and considering both chemicals are (1) generated together as byproducts during vinyl chloride monomer production; (2) handled through the same pretreatment and waste treatment equipment (incineration); and (3) are present in small, similar amounts, with *o*-dichlorobenzene expected at lower concentrations. Additionally, as isomers, both chemicals are similar in structure and physical and chemical properties. Therefore, both are expected to behave similarly during disposal and incineration, supporting the use of *p*-dichlorobenzene data as a surrogate for *o*-dichlorobenzene exposure estimation based on its COUs.

These surrogate full-shift PBZ samples were collected from 13 workers (Waste Treatment Operators) and 6 ONUs (Waste Treatment Supervisors). All of these PBZ samples were reported as non-detects (NDs) with the LOD concentrations ranging between 0.023 and 0.042 ppm, corrected to account for *o*-dichlorobenzene's differing vapor pressure. Therefore, EPA assessed the maximum LOD as the high-end and half the maximum LOD as central tendency TWA exposure concentrations. Consequently, the inhalation exposure estimates for high-end are upper-bound estimates. In cases in which all of the inhalation monitoring samples are below the LOD, EPA considers the substitution method (½ the LOD) to be the best approximation of exposure and therefore, the central tendency estimates are expected to be representative of worker inhalation exposures. The resulting risk estimates for average adult workers and ONUs were above the benchmark (MOE = 39–40) at central tendency (represented by ½ the LOD) and were below the benchmark (MOE = 20) for high-end exposure representing an upper bound (*i.e.*, the LOD). Given the consideration of this weight of evidence, EPA has moderate confidence in the exposure and risk estimates and preliminarily determined that *o*-dichlorobenzene exposure to workers from the Disposal COU does not significantly contribute to the unreasonable risk.

PPE documented at the Westlake Corporation facility indicated that waste treatment operators wore nitrile gloves. However, EPA found no data on whether similar PPE is used for *o*-dichlorobenzene disposal, and no information was provided regarding respirator use. Further details on the use of PPE relevant to disposal can be found in Table 4-14.

Distribution in Commerce

For purposes of assessment in this draft risk evaluation, Distribution in commerce consists of the transportation associated with the moving of *o*-dichlorobenzene or *o*-dichlorobenzene containing products and/or articles between manufacturing, processing, and use sites, or the transportation of *o*-dichlorobenzene containing wastes to recycling sites or for final disposal. EPA expects all the *o*-dichlorobenzene or *o*-dichlorobenzene-containing products and/or articles to be transported in closed system or otherwise to be transported in a form (*e.g.,* articles containing *o*-dichlorobenzene) such that there is negligible potential for releases except during an incident. Therefore, because no occupational exposures are reasonably expected to occur, no separate assessment was performed for estimating releases and exposures of *o*-dichlorobenzene resulting from the Distribution in commerce COU.

For the remaining COUs relevant to occupational settings, EPA has confidence in the risk estimates, all of which were above the benchmark:

- Commercial use – Fuels and related products – Fuel additive; and
- Commercial use – Air care products – Continuous action air fresheners.

As explained in Section 4.3.2, the exposure estimates for these COUs were based on modeling data for which EPA has moderate confidence. However, given that the Agency has robust confidence in the hazard and the fact that risk estimates were above the benchmark—even for high-end exposures that represent a confluence of high-values for variables in the model—provides strong evidence that these COUs do not significantly contribute to unreasonable risk. For example, model inputs for high-end exposure to workers from the Commercial use of fuels and related products COU are characterized by high concentration of VOCs in the breathing zone combined with high concentration of *o*-dichlorobenzene in the fuels. Similarly, high-end inhalation exposure to workers from the Commercial use in air care products is characterized by exclusively cleaning bathrooms in a large commercial facility (airport) for long durations and at high-intensity product use.

6.1.4 Basis for Unreasonable Risk to Consumers

Based on the consumer risk estimates, EPA has preliminarily identified significant contributions to unreasonable risk of injury to human health for consumers (Table 4-15 and Table 4-16) from one COU due to acute inhalation exposures:

- Consumer use – Other use – Other use including ceramics glaze, and cleaning and furnishing care products (*i.e.*, septic tank cleaners).

As detailed in Section 4.1.2, for the consumer use associated with *o*-dichlorobenzene-containing septic tank cleaners, consumers may be exposed to the same scenario as low-end exposure to workers using septic tank cleaners (*i.e.*, using the product no more frequently than once a day). Therefore, EPA's inhalation and dermal exposure assessment for consumers is similar to the commercial scenario resulting in an acute (*i.e.*, single day) MOE well below the benchmark MOE of 30 (MOE = 7.8×10^{-2}). The acute inhalation MOE for consumers is lower than the commercial scenario for one use a day because the consumer scenario assumes that the user is staying in the home for the rest of the day, while the worker leaves the home right after the work is completed.

As described in Section 4.1.1.1, for mass of product used, EPA identified a manuscript describing *o*-dichlorobenzene fate and transport in a domestic septic system that used a commercially available plumbing line cleaner/deodorizer, SAN-O-VAN, containing *o*-, *m*-, and *p*-dichlorobenzene at a ratio of 74:11:15, respectively (Robertson, 1994). In that study, SAN-O-VAN was injected into the household plumbing at the recommended cleansing dose of 450 mL, equivalent to 582 g. EPA considers mass used to be consistent throughout all of these products and therefore used this mass, along with the 99% weight fraction from the SDS identified in the risk evaluation (Utility Wonder Products, 2014). EPA assumed 5 minutes of use to account for the time that the consumer takes to pour the product into a toilet and flush, and used the CEM default bathroom volume of 15 m^3. Although EPA has robust confidence in the exposure and risk estimates, there is uncertainty in whether or not *o*-dichlorobenzene is currently being used or is reasonably foreseen to be used in septic tank cleaner products, given the most recent SDS identified was from 2014. Therefore, EPA intends to further investigate these uses and incorporate findings between draft and final risk evaluation. For the rest of the products and scenarios associated with this COU (*e.g.*, ceramic glazes), MOEs are above the benchmark for both inhalation and dermal exposures, and there are no significant contributions to unreasonable risk for consumer exposures for these scenarios.

No significant contribution to unreasonable risk was indicated for inhalation or dermal routes of exposure for any other consumer COU or scenario. For each of the five consumer COUs assessed, EPA evaluated the exposure to consumers using CEM or IECCU to calculate the 24-hour TWA and 1-year chronic average daily concentrations for inhalation and dermal exposures to *o*-dichlorobenzene during relevant product use. The acute MOE for the continuous action air freshener for inhalation are 69, thinners/sheep branding fluid from 76 to 1.64×10^3, lubricants and greases from 1.8×10^3 to 3.69×10^3, and other uses including ceramics glaze, and cleaning and furnishing care products from 3.4×10^3 to 4.2×10^3 (excluding the septic tank cleaner use described above). The acute MOE for the continuous action air freshener for dermal ranged from 1.89×10^3 to 2.02×10^3, thinners/sheep branding fluid from 6.56×10^5 to 1.29×10^7, lubricants and greases from 6.2×10^8 to 1.24×10^9, and other use including ceramics glaze, and cleaning and furnishing care products from 1.78×10^3 to 1.20×10^7. For acute scenarios, EPA used inputs representative of high-end for several parameters, including the highest weight fractions across all products for all exposure durations, in addition to high-end values (95th percentile) for product use frequency and duration for scenarios relevant to acute and intermediate exposure durations. For chronic exposures, EPA uses values for product use frequency and duration more representative of central tendency (50th percentile), as consumers are not anticipated to use products at their maximum frequency and duration long-term. Other modeling variables used defaults from the EFH based on expected product use, including room sizes and air flow rates to determine air concentrations for inhalation exposure and body weight and surface area of exposure to determine dermal exposure (U.S. EPA, 2011b). As detailed in Section 4.3.7.2, EPA has robust confidence in the overall characterization of exposure for consumers to products containing *o*-dichlorobenzene. This confidence is based on EPA's inputs and assumptions, as well as use of methodologies and models that previously underwent peer review and public comment, in addition to the indoor air monitoring studies that support the air concentrations determined from consumer modeling.

As detailed in Section 4.2.1, EPA has robust confidence in the non-cancer hazard values used in risk assessment, including the POD for inhalation and the POD for oral and dermal routes of exposure (liver toxicity)—each supported by consistent evidence from both apical studies and transcriptomic POD across multiple studies and species. These PODs were considered relevant across all durations. Based on the overall weight of evidence and applying the ReCAAP framework, EPA does not expect cancer risk and concluded that quantitative cancer risk assessment of *o*-dichlorobenzene is not warranted.

As indicated in Section 4.3.3, EPA presented only the risk estimates for acute inhalation exposure, which for most COUs assumed high-end values for product weight fraction, frequency, and duration of use resulting in MOEs above the benchmark for all but one consumer COU. The Agency only presented the acute MOEs in the risk characterization (Table 4-15) given that the chronic MOEs are even further above the benchmark (U.S. EPA, 2026j). Similarly for dermal exposure, both adult and youth acute MOEs were above the benchmark for all scenarios (Table 4-16).

6.1.5 Basis for No Unreasonable Risk to General Population

EPA preliminarily did not identify significant contributions to unreasonable risk to the general population from any exposure route or pathway. For several exposure pathways depicted in the conceptual diagram in Section 4.1.3, EPA determined that general population exposures to *o*-dichlorobenzene are not expected, including exposure via swimming, fish ingestion, and land. As explained in Section 4.1.3.1, general population exposures through swimming and fish ingestion are not expected because *o*-dichlorobenzene in surface water is expected to volatilize given its physical and chemical properties and low potential to bioaccumulate in organisms based on measured BCF values. Furthermore, EPA did not model deposition from air because *o*-dichlorobenzene is not expected to associate strongly with airborne particulates or subsequently undergo deposition. Sediments and soil are also not expected to be major pathways for *o*-dichlorobenzene based on low partition coefficients to organic matter. Therefore, the Agency did not develop risk estimates for exposure via swimming, fish ingestion, or land pathways *(e.g.*, soil or biosolids).

For the remaining pathways depicted in the conceptual diagram in Section 4.1.3, EPA employed a screening method for assessing high-end exposure scenarios with data that reflects exposure expected to occur in proximity to releasing facilities, including to fenceline communities, for the following exposure durations, routes, and pathways:

- acute and chronic inhalation exposure from ambient air;
- acute and chronic inhalation exposure from indoor air; and
- Acute and chronic ingestion exposure from drinking water.

The Agency evaluated ambient air, indoor air, and drinking water using an MOE approach using high-end exposure estimates to determine whether an exposure pathway had potential non-cancer risks. High-end exposure estimates were defined as those occuring at 95th percentile for OES associated with industrial and commercial uses, which may result in environmental release. If risk estimates for individuals identified as having the potential for high-end exposure for a COU and given pathway of exposure do not exceed benchmarks, then any exposure estimates based on lower releases and exposure factors likewise will not exceed benchmarks. For this reason, the pathway was not evaluated further. MOEs were above the benchmark for the highest exposure scenarios for ambient air, indoor air, and drinking water based on this screening level assessment. Specifically, all non-cancer risk estimates were above the benchmark for both acute and chronic exposures for 95th percentile-modeled outdoor air concentrations from TRI facility releases, and the highest indoor air concentration would be equivalent to the outdoor air concentration. Similarly for drinking water, the screening-level assessment using the 95th percentile drinking water intake rate, along with the highest concentrations reported in surface water and groundwater (without consideration of removal from drinking water treatment), resulted in acute and chronic MOEs above the benchmark of 30 for both adults and infants. Therefore, EPA preliminarily did not identify unreasonable risk of injury to the general population via ambient air, indoor air, or drinking water.

EPA is confident that this screening-level assessment for risk to the general population applies across all COUs. The Agency assessed releases using data reported to TRI and DMR from 2019 to 2023 for the following COUs, as described in Section 3.2.1:

- Manufacturing – Manufacture – Domestic manufacture;
- Processing –Processing as a reactant;
- Processing – Incorporation into formulation, mixture or reaction product – Intermediates in all other basic organic chemical manufacturing;
- Industrial use – Solvents (which become part of product formulation or mixture) – Printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing; and
- Disposal.

In some cases, no facilities were identified that could be mapped to a given COU. Because general population risk from *o*-dichlorobenzene was not found for the highest releases reported to TRI and DMR, EPA did not estimate releases from other COUs that have lower releases. Specifically, there was no data from TRI, NEI, or DMR on releases to air, water, or land from facilities that use *o*-dichlorobenzene for the following COUs:

- Processing – Repackaging
- Processing – Incorporation into formulation, mixture, or reaction product – Solvents (which become part of product formulation or mixture), including Plastic Compounding and Plastic Converting OES)
- Processing – Incorporation into formulation, mixture or reaction product –Soap, cleaning compound, and toilet preparation manufacturing
- Industrial use – Functional fluids (closed system) Industrial use – All other basic organic chemical manufacturing
- Commercial use – Ink, toner, and colorant products – Ink and toners
- Commercial use – Paints and coatings – Coatings and paints, thinners, paint removers
- Commercial use – Lubricants and greases
- Commercial use – Fuels and related products – Fuel additive
- Commercial use – Air care products – Continuous action air fresheners
- Commercial use – Other use – Laboratory chemicals; cleaning and furnishing care products
- Consumer use – Paints and coatings – Thinners, sheep-branding fluid.

Therefore, EPA expects that releases to air, water, and land from these COUs to be less than for the COUs that had release data from TRI and DMR, as depicted in Table 3-3, otherwise they would have been reported to the programmatic release databases. For these reasons, the Agency has preliminarily determined that there are no significant contributions to risk to the general population from these COUs given that risks to the general population were not identified for the COUs with release data for *o*-dichlorobenzene (Table 3-3). Further information on those OES for which EPA did not identify release data, and the corresponding assumptions and uncertainties, are detailed in Section 3.2.1.1 and Table 3-4.

As described in Section 4.3.7.3, EPA has robust confidence in the overall characterization of exposure for general population for all three pathways of concern. This robust confidence is based on high levels of confidence in underlying release information used to estimate exposures, the completeness of the datasets modeled, and the modeling methods used. Specifically, EPA used actual facility-reported release data from TRI across multiple years to provide a comprehensive and representative ambient air exposure assessment. Furthermore, there is close alignment between these EPA-modeled concentrations when compared to AQS monitoring data, and the various lines of evidence described in Section 4.3.7.1 demonstrate the OPPT methodologies and models used for this *o*-dichlorobenzene assessment do not overestimate exposures via the ambient air pathway. Similarly, for drinking water, the exposure parameters were selected to evaluate high-end, conservative exposure scenarios to inform whether there are exposures (and associated risk estimates) for age groups ranging from infants (birth to <1 month) to adults. Moreover, the highest concentrations reported in surface water and groundwater were taken into consideration for subpopulations that use untreated surface water or groundwater as a primary source of drinking water. In addition to confidence in the exposure as high-end screening estimates, EPA has robust confidence in the inhalation POD for respiratory toxicity and the oral/dermal POD for liver toxicity as described in Section 4.2.1, and therefore has robust confidence in the resulting risk estimates and the preliminary determination that no exposure route or pathway to the general population from any COU significantly contribute to the unreasonable risk determination for *o*-dichlorobenzene.

6.2 Unreasonable Risk to the Environment

6.2.1 Basis for No Unreasonable Risk to the Environment

Based on the risk evaluation for *o*-dichlorobenzene, including the physical and chemical properties of *o*-dichlorobenzene, the environmental exposures and effects, the resulting risk estimates, and consideration of strengths, limitations, and uncertainties, EPA preliminarily did not identify significant contributions to unreasonable risk of injury to the environment from exposure to *o*-dichlorobenzene via any COU.

EPA assessed environmental concentrations of *o*-dichlorobenzene in air, water, and land (soil, biosolids, and groundwater) for use in the environmental exposure assessment. For each of these media, EPA compared high-end exposure estimates from modeling and monitoring data to the most sensitive hazard values for each of the relevant taxa exposed to those media in a screening-level assessment. As previously detailed in Section 6.1.5, EPA is confident that this screening-level assessment for risk based on concentrations of *o*-dichlorobenzene in the environment from releases applies across all COUs. EPA assessed releases using data reported to TRI and DMR from 2019 to 2023 for Manufacturing, Processing as a reactant, Industrial use of solvents, and Disposal COUs and determined that environmental releases for all other COUs are expected to be lower than releases associated with processing. Therefore, EPA is confident that when no risk is indicated with the screening level approaches based on concentrations resulting from the maximum releases, that no significant contribution to unreasonable risk will occur from any COU.

Aquatic Species

Environmental releases of *o*-dichlorobenzene to surface water are minimal, comprising less than 1% of total releases to the environment. Furthermore, the *o*-dichlorobenzene that is released to water is not expected to persist in water due to minimal sorption to sediment and organic matter and partitioning to air via volatilization. Monitoring data support this assertion, in that *o*-dichlorobenzene is rarely detected in surface water, with greater than 99% of the *o*-dichlorobenzene surface water samples below LODs, quantification, and/or reporting (Section 5.3.2).

EPA's screening level assessment determined that, even under low flow conditions, the receiving water concentration modeled using the highest maximum annual release of *o*-dichlorobenzene to surface water from DMR and TRI data from 2019 through 2023 is about two orders of magnitude lower than the (1) acute aquatic hazard thresholds identified for vertebrates and invertebrates, (2) the chronic hazard threshold for aquatic vertebrates, and (3) the hazard threshold for aquatic plants and algae (Section 5.3.2). Likewise, the actual release of *o*-dichlorobenzene associated with the lowest flow results in a similar concentration in the receiving water body that is also about two orders of magnitude lower than the aquatic hazard concentrations of concern (Section 5.3.2). Finally, *o*-dichlorobenzene is not expected to remain in surface water for a long enough to result in chronic hazard to aquatic organisms. It also has low potential for trophic transfer through food webs, due to its loss from surface water as a result of volatilization, minimal sorption to organic material and bioconcentration potential, and rapid elimination. EPA preliminarily did not identify unreasonable risk of injury to aquatic or sediment-dwelling vertebrates or invertebrates exposed to *o*-dichlorobenzene in water and sediment from any of the COUs.

Terrestrial Species

Terrestrial organisms may be exposed to *o*-dichlorobenzene via ambient air from fugitive or stack releases. Furthermore, extensive ambient air monitoring data show that *o*-dichlorobenzene is prevalent in ambient air and confirms that air is the primary exposure pathway for *o*-dichlorobenzene. The highest ambient air concentration modeled was 24 $\mu g/m^3$ *o*-dichlorobenzene at 100 m away from a facility release point; the highest monitored concentration in ambient air was 26 $\mu g/m^3$. The close alignment between the high-end air concentrations from both modeling and monitoring supports robust confidence in these values for this screening-level assessment. Importantly, the most sensitive toxicity endpoint available for vertebrates (559 mg/m^3) is more than four orders of magnitude higher than the high-end modeled and measured *o*-dichlorobenzene concentrations in ambient air.

Aside from inhalation of *o*-dichlorobenzene in ambient air, no other routes significantly contribute to exposure of terrestrial organisms to *o*-dichlorobenzene. There are no appreciable direct releases of *o*-dichlorobenzene to land, and model estimates indicate that air deposition of *o*-dichlorobenzene to land is negligible. Based on its physical and chemical properties, any *o*-dichlorobenzene present in soil from releases or deposition is not expected to persist due to low sorption to soils or organic matter and loss to volatilization. Therefore, *o*-dichlorobenzene exposure via direct contact with soil is expected to be negligible. Finally, given that *o*-dichlorobenzene does not bioaccumulate, dietary exposure of *o*-dichlorobenzene to terrestrial organisms is not expected.

EPA preliminarily did not identify unreasonable risk of injury to terrestrial organisms exposed to *o*-dichlorobenzene via any relevant land pathway and route (*e.g.*, ambient air, soil, ingestion) from any of the COUs.

As further detailed in Section 5.3.4, EPA has robust overall confidence in the environmental risk assessment, including the conclusion that there is no expected risk to aquatic organisms via the water pathway or to terrestrial organisms via the land pathway or dietary pathway. EPA additionally has moderate confidence that there is no expected risk to terrestrial organisms via ambient air exposure. Although the use of both modeled and monitored air concentrations from screening, together with the most sensitive hazard endpoint for terrestrial vertebrates, support robust confidence, the use of hazard data from laboratory rodents to represent wildlife populations of terrestrial mammals and the lack of hazard data on avian species are remaining uncertainties—thereby supporting moderate overall confidence in the risk characterization for terrestrial species. Finally, risk to terrestrial invertebrates is not expected; any *o*-dichlorobenzene present in soil from releases or deposition is not expected to persist due to low sorption to soil or organic matter and loss to volatilization. Therefore, EPA preliminarily did not identify any unreasonable risk of injury to the environment for any pathway.

6.3 Additional Information Regarding the Basis for the Unreasonable Risk Determination

Table 6-1 and Table 6-2 summarize the basis for this preliminary unreasonable risk determination of injury to human health presented in the assessment for occupational uses. The bolded/shaded text indicate significant contributions to unreasonable risk. The table identifies both the duration of exposure (*i.e.,* acute) and the exposure route to the population. Risk estimates across the full range of variables for the occupational COUs are available in the *Draft Occupational Risk Calculator* (U.S. EPA, 2026ac). For this preliminary unreasonable risk determination, EPA has considered the effects of *o*-dichlorobenzene to human health, including PESS, as well as a range of risk estimates as appropriate, risk-related factors, and the confidence in the analysis. See Section 4.3 for a summary of risk estimates.

Table 6-1. Supporting Basis for the Preliminary Unreasonable Risk Determination for Human Health (Workers)

Condition of Use (COU)		Occupational Exposure Scenario	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)	
Life Cycle Stage/ Category	**Subcategory**					**Risk Estimates for No PPE**	**Risk Estimates with PPE**
						Acute [a]	**Acute [a]**
Manufacturing/ Manufacture	Domestic manufacture	Manufacturing	Workers and ONUs	Inhalation and Dermal	Central Tendency	–	–
					High-End	**–**	–
Manufacturing/ Import	Import	Repackaging	Worker-Polymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	65	PPE not needed
					High-End	**5.7 [a]**	57 (APF 10)
			Worker- Copolymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	61	PPE not needed
					High-End	**6.4**	64 (APF 10)
			Average Adult Worker [g h]	Dermal	Central Tendency	34	N/A – glove PF cannot be assigned
					High-End	**14**	
			ONU [f]	Inhalation 8-hour TWA	Single data point	69	N/A
Processing as a reactant	Processing as a reactant	Processing as a Reactant	Material Handlers [e]	Inhalation 12-hour TWA	Central Tendency	29	PPE not needed
					High-End	**1.4**	34 (APF 25)
			Process Field Operators [f]	Inhalation 12-hour TWA	Central Tendency	205	PPE not needed
					High-End	34	PPE not needed
			Lab Technician [e]	Inhalation 12-hour TWA (*p*-dichlorobenzene surrogate)	Central Tendency	15 [j]	155 (APF 10)
					High-End	7.4 [j]	74 (APF 10)
				Inhalation 8-hour TWA (1,1,2-TCA surrogate)	Central Tendency	1.2E04 [k]	PPE not needed
					High-End	131 [k]	PPE not needed
				Inhalation 12-hour TWA (1,1,2-TCA surrogate)	Central Tendency	3.5E04 [k]	PPE not needed
					High-End	822 [k]	PPE not needed

Condition of Use (COU)		Occupational Exposure Scenario	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)	
Life Cycle Stage/ Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute [a]	Acute [a]
Processing as a reactant	Processing as a reactant	Processing as a Reactant	Average Adult Worker [g]	Dermal	Central Tendency	34	N/A – glove PF cannot be assigned
					High-End	**14**	
			ONU [f]	Inhalation 12-hour TWA	Central Tendency	28 [j]	N/A
					High-End	14 [j]	N/A
Processing – Incorporation into formulation, mixture, or reaction product	Intermediates in all other basic organic chemical manufacturing	Processing as a Reactant	Material Handlers [e]	Inhalation 12-hour TWA	Central Tendency	29	286 (APF 10)
					High-End	**1.4**	34 (APF 25)
			Process Field Operators [f]	Inhalation 12-hour TWA	Central Tendency	205	PPE not needed
					High-End	34	PPE not needed
			Lab Technician [e]	Inhalation 12-hour TWA (*p*-dichlorobenzene surrogate)	Central Tendency	15 [j]	155 (APF 10)
					High-End	7.4 [j]	74 (APF 10)
				Inhalation 8-hour TWA (1,1,2-TCA surrogate)	Central Tendency	1.2E04 [k]	PPE not needed
					High-End	131 [k]	PPE not needed
				Inhalation 12-hour TWA (1,1,2-TCA surrogate)	Central Tendency	3.5E04 [k]	PPE not needed
					High-End	822 [k]	PPE not needed
			Average Adult Worker [g]	Dermal	Central Tendency	34	N/A – glove PF cannot be assigned
					High-End	**14**	
			ONU [f]	Inhalation 12-hour TWA	Central Tendency	28 [j]	N/A
					High-End	14 [j]	N/A
Processing – Incorporation into formulation, mixture, or reaction product	Solvents (which become part of product formulation or mixture)	Incorporation into Formulation, Mixture, or Reaction Product	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	**6.0**	60 (APF 10)
					High-End	**0.14**	135 (APF 1,000)

Condition of Use (COU)		Occupational Exposure Scenario	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)	
Life Cycle Stage/ Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute [a]	Acute [a]
Processing – Incorporation into formulation, mixture, or reaction product	Solvents (which become part of product formulation or mixture)	Incorporation into Formulation, Mixture, or Reaction Product	Average Adult Worker [i]	Dermal	Central Tendency	529	N/A – glove PF cannot be assigned
					High-End	129	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	**6.0**	N/A
		Plastics Compounding	Workers and ONUs	Inhalation and Dermal	Central Tendency	–	–
					High-End	–	–
		Plastics Converting	Workers and ONUs	Inhalation and Dermal	Central Tendency	–	–
					High-End	–	–
	Soap, cleaning compound, and toilet preparation manufacturing	Incorporation into Soap, Cleaning Compound, and Toilet Preparation Manufacturing	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	**4.8**	48 (APF 10)
					High-End	**1.2**	59 (APF 50)
			Average Adult Worker [i]	Dermal	Central Tendency	34	N/A – glove PF cannot be assigned
					High-End	**14**	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	**4.8**	N/A
Processing/ Recycling	Recycling	Industrial Use of Solvents	Polymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	66	PPE not needed
					High-End	**6.0**	60 (APF 10)
			Copolymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	61	PPE not needed
					High-End	**6.4**	64 (APF 10)
			Maintenance Mechanics and Electricians [e]	Inhalation 8-hour TWA	Central Tendency	156	PPE not needed
					High-End	**12**	120 (APF 10)
			Average Adult Worker [g h]	Dermal	Central Tendency	32	N/A – glove PF cannot be assigned
					High-End	**13**	

Condition of Use (COU)		Occupational Exposure Scenario	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)	
Life Cycle Stage/ Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute [a]	Acute [a]
Processing/ Recycling	Recycling	Industrial Use of Solvents	ONU [f]	Inhalation 8-hour TWA	Central Tendency	87	N/A
					High-End	**12**	N/A
Processing/ Repackaging	Repackaging	Repackaging	Worker-Polymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	65	PPE not needed
					High-End	**5.7**	N/A
			Worker- Copolymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	61	PPE not needed
					High-End	**6.4**	64 (APF 10)
			Average Adult Worker [g,h]	Dermal	Central Tendency	34	N/A – glove PF cannot be assigned
					High-End	**14**	
			ONU [f]	Inhalation 8-hour TWA	Single Value	69	N/A
Distribution in commerce	Distribution in commerce	Distribution in Commerce	Workers and ONUs	Inhalation and Dermal	Central Tendency	–	–
					High-End	–	–
Industrial use/ Solvents (which become part of product formulation or mixture)	Printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing	Industrial Use of Solvents	Polymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	66	PPE not needed
					High-End	**6.0**	60 (APF 10)
			Copolymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	61	PPE not needed
					High-End	**6.4**	64 (APF 10)
			Maintenance Mechanics and Electricians [e]	Inhalation 8-hour TWA	Central Tendency	156	PPE not needed
					High-End	**12**	120 (APF 10)
			Average Adult Worker [g h]	Dermal	Central Tendency	32	PPE not needed
					High-End	**13**	130 (APF 10)
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	87	N/A
					High-End	**12**	N/A

Condition of Use (COU)		Occupational Exposure Scenario	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)	
Life Cycle Stage/ Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute [a]	Acute [a]
Industrial use/ Functional fluids (closed system)	All other basic organic chemical manufacturing	Functional Fluids (Closed System)	Average Adult Worker [e]	Inhalation 12-hour TWA	Central Tendency	64	PPE not needed
					High-End	**4.9**	49 (APF 10)
			Average Adult Worker [g h]	Dermal	Central Tendency	43	N/A – glove PF cannot be assigned
					High-End	**17**	
			ONU [f]	Inhalation 12-hour TWA	Central Tendency	64	N/A
Industrial use/ Non-incorporative activities	Processing aids, not otherwise listed	Industrial Use of Solvents	Polymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	66	PPE not needed
					High-End	**6.0**	60 (APF 10)
			Copolymer Chemical Operators [e]	Inhalation 8-hour TWA	Central Tendency	61	PPE not needed
					High-End	**6.4**	64 (APF 10)
			Maintenance Mechanics and Electricians [e]	Inhalation 8-hour TWA	Central Tendency	156	PPE not needed
					High-End	**12**	120 (APF 10)
			Average Adult Worker [g,h]	Dermal	Central Tendency	32	N/A – glove PF cannot be assigned
					High-End	**13**	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	87	N/A
					High-End	**12**	N/A
Commercial use/ Ink, toner, and colorant products	Ink and toners	Use of Ink, Toner, and Colorant Products	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	80	PPE not needed
					High-End	**18**	177 (APF 10)
			Average Adult Worker [i]	Dermal	Central Tendency	485	N/A – glove PF cannot be assigned
					High-End	148	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	80	N/A

Condition of Use (COU)		Occupational Exposure Scenario	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)	
Life Cycle Stage/ Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute [a]	Acute [a]
Commercial use/ Paints and coatings	Coatings and paints, thinners, paint removers	Use of Paints and Coatings	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	**5.9**	147 (APF 25)
					High-End	**0.18**	180 (APF 1,000)
			Average Adult Worker [e]	Dermal	Central Tendency	405	N/A – glove PF cannot be assigned
					High-End	101	
			ONU [i]	Dermal	Central Tendency	677	N/A – glove PF cannot be assigned
					High-End	259	
			ONU [f]	Inhalation	Central Tendency	**5.9**	N/A
		Use of Paint Thinners & Removers	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	265	PPE not needed
					High-End	133	PPE not needed
			Average Adult Worker [i]	Dermal	Central Tendency	527	N/A – glove PF cannot be assigned
					High-End	130	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	265	N/A
Commercial use/Lubricants and greases	Lubricants and greases	Use of Lubricants and Greases	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	101	PPE not needed
					High-End	**19**	192 (APF 10)
			Average Adult Worker [i]	Dermal	Central Tendency	3,945	N/A – glove PF cannot be assigned
					High-End	1,007	
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	101	N/A
Commercial use/Fuels and related products	Fuel additive	Use of Fuels and Related Products	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	2.1E05	PPE not needed
					High-End	9,640	PPE not needed
			Average Adult Worker [i]	Dermal	Central Tendency	2.5E04	N/A – glove PF cannot be assigned
					High-End	7,401	

Condition of Use (COU)		Occupational Exposure Scenario	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)	
Life Cycle Stage/ Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute [a]	Acute [a]
Commercial use/Fuels and related products	Fuel additive	Use of Fuels and Related Products	ONU [f]	Inhalation 8-hour TWA	Central Tendency	2.1E05	N/A
Commercial use/Air care products	Continuous action air fresheners	Use in Solid Air Care Products	Average Adult Worker [e]	Inhalation 8-hour TWA	N/A [c]	480	PPE not needed
			Average Adult Worker [g]	Dermal	N/A [c]	1,041	N/A – glove PF cannot be assigned
Commercial use/Other use	Laboratory chemicals; Cleaning and furnishing care products	Use of Laboratory Chemicals	Average Adult Worker [e]	Inhalation 12-hour TWA (*p*-dichlorobenzene surrogate)	Central Tendency	15 [j]	150 (APF 10)
					High-End	7.4 [j]	74 (APF 10)
			Average Adult Worker [e]	Inhalation 8-hour TWA (1,1,2-TCA surrogate)	Central Tendency	1.2E04 [k]	PPE not needed
					High-End	131 [k]	PPE not needed
			Average Adult Worker [e]	Inhalation 12-hour TWA (1,1,2-TCA surrogate)	Central Tendency	3.5E04 [k]	PPE not needed
					High-End	822 [k]	PPE not needed
			Average Adult Worker [h]	Dermal	Central Tendency	128	N/A – glove PF cannot be assigned
					High-End	**19**	
			ONU [f]	Inhalation 12-hour TWA (*p*-dichlorobenzene surrogate)	Central Tendency	15	N/A
			ONU [f]	Inhalation 8-hour TWA (1,1,2-TCA surrogate)	Central Tendency	1.2E04 [k]	N/A
			ONU [f]	Inhalation 12-hour TWA (1,1,2-TCA surrogate)	Central Tendency	3.5E04 [k]	N/A

Condition of Use (COU)		Occupational Exposure Scenario	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)	
Life Cycle Stage/ Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute [a]	Acute [a]
Commercial use/Other use	Laboratory chemicals; Cleaning and furnishing care products	Use of Cleaning and Furnishing Care Products	Average Adult Worker [e]	Inhalation 8-hour TWA	Single data point	**4.5**	45 (APF 10)
			Average Adult Worker [i]	Dermal	Central Tendency	34	N/A – glove PF cannot be assigned
					High-End	**14**	
		Use of Other Cleaning Products	Average Adult Worker [e]	Inhalation 24-hour TWA (assuming 8 hours of exposure)	Low-End	**9.3E−02**	93 (APF 1,000)
					High-End	**1.2E−02**	12 (APF 1,000)
				Dermal	Low-End	38	N/A – glove PF cannot be assigned
					High-End	**15**	
Consumer use/Paints and coatings	Thinners; Sheep branding fluid	N/A	Average Adult Worker [e]	Inhalation 8-hour TWA	Central Tendency	–	–
					High-End	–	–
			ONU [f]	Inhalation 8-hour TWA	Central Tendency	–	–
					High-End	–	–
			Average Adult Worker [i]	Dermal	Central Tendency	349	N/A – glove PF cannot be assigned
					High-End	117	
Disposal	Disposal	Disposal	Average Adult Worker	Inhalation 12-hour TWA	Central Tendency	39	PPE not needed
					High-End	20	195 (APF 10)
			ONU [e]	Inhalation 8-hour TWA	Central Tendency	40	N/A
					High-End	20	N/A
			ONU [f]	Inhalation 12-hour TWA	Central Tendency	40	N/A
					High-End	20	N/A
			Average Adult Worker [g]	Dermal	Central Tendency	1,262	N/A – glove PF cannot be assigned
					High-End	492	

Condition of Use (COU)		Occupational Exposure Scenario	Population	Exposure Route and Duration	Exposure Level	Non-Cancer Risk Estimates (Benchmark = 30)	
Life Cycle Stage/ Category	Subcategory					Risk Estimates for No PPE	Risk Estimates with PPE
						Acute [a]	Acute [a]

1,1,2-TCA = 1,1,2-trichloroethane; PF = protection factor; TWA = time-weighted average
[a] **Bolded/shaded** cells for risk estimates indicate COUs that EPA has preliminarily determined contribute to unreasonable risk.
[b] The inhalation exposures for these OESs were estimated using IECCU (air care products) and CEM (sheep branding fluid), which do not specify between central tendency and high end exposure, nor between workers and ONUs
[c] Available data for this OES and/or population reports that chemical respirators are used.
[d] Available data for this OES and/or population reports that available respiratory protection is either only for emergency use (escape respirator) or is likely only protective of particulates (N95, medical masks).
[e] No information indicating respirator use of any kind was available.
[f] Respirator use is assumed to not be applicable for ONUs in the absence of population-specific information.
[g] Available data for this OES and/or population reports that gloves are routinely indicated or expected.
[h] Glove use was reported as either rarely/inconsistently used or was only recommended by the manufacturer without any evidence of regular use.
[i] No information indicating glove use of any kind was available and regular glove use would not be expected.
[j] Risk estimates based on all ND, so central tendency exposure was estimated as ½ LOD and high-end exposure was estimated as equal to the LOD.
[k] Additional surrogate data from 1,1,2-TCA had a much lower LOD than when using *p*-dichlorobenzene, so predominantly detections; concentrations were corrected for differences in vapor pressure, and the resulting risk estimates were orders of magnitude above the benchmark. These lines of evidence support the conclusion that Lab Technicians SEG does not significantly contribute to unreasonable risk for this COU.
"–" Exposures were not quantified for these OESs, however, exposures are expected to be negligible (Section 4.3.2.1.1).

Table 6-2. Supporting Basis for the Preliminary Unreasonable Risk Determination for Human Health (Consumers)

Life Cycle Stage/ Category	Subcategory/ Consumer Condition of Use Scenario	Product	Inhalation Acute Non-Cancer (Benchmark MOE = 30)
Air care products	Continuous action air fresheners (2 bathrooms)	Toilet Bowl Deodorizer	69
Lubricants and greases	Lubricants and greases	Marvel Mystery Oil [a]	1.8E03
		Marvel Air Tool	3.7E03
Paints and coatings	Thinners; Sheep-branding fluid	Sheep Branding Fluid	1.6E03
		Paint Thinner (test order emission rate)	3.8E02
		Paint Thinner (default emission rate)	76
Other use	Other use including ceramics glaze, and cleaning and furnishing care products	Ceramic Glaze (test order emission rate)	3.4E03
		Ceramic Glaze (default emission rate)	4.2E03
		Septic Tank Cleaners	**7.8E−02**

[a] The Marvel Mystery Oil falls under both lubricants/greases and fuel additive COUs. For the purpose of this assessment, the product was evaluated under lubricants/greases and would use the same inputs and assumptions as for fuel additives.
Bolded/shaded cells for risk estimates indicate COUs that EPA has preliminarily determined contribute to unreasonable risk.

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APPENDICES

Appendix A KEY ABBREVIATIONS AND ACRONYMS

ADC	Average daily concentration
ADD	Average daily dose
ADR	Acute dose rate
APDR	Acute potential dermal dose rates
APF	Assigned protection factor
ATSDR	Agency for Toxic Substances and Disease Registry (U.S.)
BAF	Bioaccumulation factor
BCF	Bioconcentration factor
BMD	Benchmark dose
CASRN	Chemical Abstracts Service Registry Number
CDR	Chemical Data Reporting
CEHD	Chemical Exposure Health Data (OSHA)
CEM	Consumer Exposure Model
CFR	Code of Federal Regulations
COC	Concentration of Concern
COU	Condition of use
DMR	Discharge Monitoring Report
ECHA	European Chemicals Agency
EPA	Environmental Protection Agency (U.S.)
ESD	Emission scenario document
ECEL	Existing chemical exposure limit
GS	Generic scenario
HEC	Human equivalent concentration
HED	Human equivalent dose
HERO	Health and environmental research online (database)
IECCU	Indoor Environmental Concentrations in Buildings with Conditioned and Unconditioned Zones (Model)
IIOAC	Integrated Indoor-Outdoor Air Calculator
K_{OA}	Octanol/air partition coefficient
K_{OC}	Organic carbon/water partition coefficient
K_{OW}	Octanol/water partition coefficient
LCD	Life cycle diagram
LOD	Limit of detection
LOQ	Limit of quantification
MOA	Mode of action
MOE	Margin of exposure
NAICS	North American Industry Classification System
ND	Non-detect
NEI	National Emissions Inventory
NIOSH	National Institute for Occupational Safety and Health (U.S.)
NPDES	National Pollutant Discharge Elimination System
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational exposure limits
OES	Occupational exposure scenario
ONU	Occupational non-user

OPPT	Office of Pollution Prevention and Toxics (EPA)
OSHA	Occupational Safety and Health Administration (U.S.)
PBZ	Personal breathing zone
PEL	Permissible exposure limit
PECO	Populations, exposures, comparators, and outcomes
PESS	Potentially exposed or susceptible subpopulations
PF	Protection factor
POD	Point of departure
POTW	Publicly owned treatment works
PPE	Personal protective equipment
PV	Production volume
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
ReCAAP	Rethinking Chronic Toxicity and Carcinogenicity Assessment for Agrochemicals Project
SACC	Science Advisory Committee on Chemicals
SDS	Safety data sheet
STEL	Short-term exposure limit
TLV	Threshold limit value
TRI	Toxics Release Inventory
TRV	Toxicity reference value
TSCA	Toxic Substances Control Act
TSD	Technical support document
TWA	Time-weighted average
UF	Uncertainty factor
U.S.	United States
VCM	Vinyl chloride monomer
WWTP	Wastewater treatment plant

Appendix B REGULATORY AND ASSESSMENT HISTORY

The chemical substance, *o*-dichlorobenzene, is subject to federal and state laws and regulations in the United States (Table_Apx B-1 and Table_Apx B-2). Regulatory actions by other governments, tribes, and international agreements applicable to *o*-dichlorobenzene are listed in Table_Apx B-3. EPA conducted a search of existing domestic and international laws, regulations, and assessments pertaining to *o*-dichlorobenzene.

B.1 Federal Laws and Regulations

Table_Apx B-1. Federal Laws and Regulations

Statute	General Description of Authority or Regulation	Chemical-Specific Summary
EPA statutes/regulations		
Toxic Substances Control Act (TSCA) – section 6(b)	EPA is directed to identify high-priority chemical substances for risk evaluation; and conduct risk evaluations on at least 20 high priority substances no later than three and one-half years after the date of enactment of the Frank R. Lautenberg Chemical Safety for the 21st Century Act.	*o*-Dichlorobenzene is one of the 20 chemicals EPA designated as a High-Priority Substance for risk evaluation under TSCA (84 FR 71924, December 30)
Toxic Substances Control Act (TSCA) – section 8(a)	The TSCA section 8(a) Chemical Data Reporting (CDR) Rule requires manufacturers (including importers) to give EPA basic exposure-related information on the types, quantities and uses of chemical substances produced domestically and imported into the United States.	*o*-Dichlorobenzene manufacturing (including importing), processing and use information is reported under the CDR rule (40 CFR part 711).
Toxic Substances Control Act (TSCA) – section 8(b)	EPA must compile, keep current and publish a list (the TSCA Inventory) of each chemical substance manufactured (including imported) or processed for commercial purposes in the United States.	*o*-Dichlorobenzene (benzene, 1,2-dichloro-) was on the initial TSCA Inventory and therefore was not subject to EPA's new chemicals review process under TSCA Section 5 (60 FR 16309, March 29, 1995).
Toxic Substances Control Act (TSCA) – section 8(d)	Provides EPA with authority to issue rules requiring manufacturers (including importers), processors, and distributors of a chemical substance or mixture to submit lists and/or copies of ongoing and completed, unpublished health and safety studies. EPA's Health and Safety Data Reporting Rule at 40 CFR part 716 generally requires such submissions for manufacturers (including importers) and (if specified) processors of substances covered by part 716.	Six health and safety studies received for *o*-dichlorobenzene (2021) (U.S. EPA, ChemView. Accessed May 13, 2025).

Statute	General Description of Authority or Regulation	Chemical-Specific Summary
Toxic Substances Control Act (TSCA) – section 8(e)	Manufacturers (including importers), processors, and distributors must immediately notify EPA if they obtain information that supports the conclusion that a chemical substance or mixture presents a substantial risk of injury to health or the environment.	Two substantial risk reports received for *o*-dichlorobenzene (2010) (U.S. EPA, ChemView. Accessed January 20, 2026).
Toxic Substances Control Act (TSCA) – section 4	Provides EPA with authority to issue rules, enforceable consent agreements and orders requiring manufacturers (including importers) and processors to test chemical substances and mixtures.	The Frank R. Lautenberg Chemical Safety for the 21st Century Act revised TSCA section 4 to add authority to issue test orders. Under this authority EPA issued test orders for information on environmental hazard, inhalation, and dermal exposures to workers, and consumer exposures for *o*-dichlorobenzene in January 2021 and March 2022.
Emergency Planning and Community Right-To-Know Act (EPCRA) – section 313	EPCRA Section 313 – also known as the Toxic Release Inventory (TRI) – requires annual reporting from facilities in specific industry sectors that employ 10 or more full-time equivalent employees and that manufacture, process or otherwise use a TRI-listed chemical in quantities above threshold levels. A facility that meets reporting requirements must submit a reporting form for each chemical for which it triggered reporting, providing data across a variety of categories, including activities and uses of the chemical, releases and other waste management (*e.g.*, quantities recycled, treated, combusted) and pollution prevention activities (under section 6607 of the Pollution Prevention Act). These data include on- and off-site data as well as multimedia data (*i.e.*, air, land and water).	*o*-Dichlorobenzene (1,2-dichlorobenzene) is a listed substance subject to reporting requirements under 40 CFR 372.65 effective as of January 01, 1987.
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) – sections 3 and 6	FIFRA governs the sale, distribution and use of pesticides. Section 3 of FIFRA generally requires that pesticide products be registered by EPA prior to distribution or sale. EPA assesses the whole formulation of pesticide products including active ingredients which have pesticidal effects and inert ingredients that do not. EPA keeps lists of inert ingredients that have been approved for use in pesticide products distinguishing between those that have been approved for use on food and those that have not. Pesticide products may only be registered if, among other things, they do not cause "unreasonable adverse effects on the environment." Section 6 of FIFRA provides EPA with the authority to cancel pesticide registrations if either (1) the pesticide, labeling, or other material does not comply with FIFRA;	The first pesticide product containing *o*-dichlorobenzene as an antimicrobial and conventional chemical was registered in 1967. The last products containing *o*-dichlorobenzene as an active ingredient were cancelled in November 1992 (Pesticide Chemical Search, Accessed February 26, 2026). No registration actions have been submitted in support of *o*-dichlorobenzene, for either antimicrobial or conventional chemical uses. No reregistration activities have been conducted since there are no active registrations. (Pesticide Chemical Search, Accessed February 26, 2026).

Statute	General Description of Authority or Regulation	Chemical-Specific Summary
	or (2) when used in accordance with widespread and commonly recognized practice, the pesticide generally causes unreasonable adverse effects on the environment.	
Clean Air Act (CAA) – Section 111(b)	Requires EPA to establish new source performance standards (NSPS) for any category of new or modified stationary sources that EPA determines causes, or contributes significantly to, air pollution, which may reasonably be anticipated to endanger public health or welfare. The standards are based on the degree of emission limitation achievable through the application of the best system of emission reduction (BSER) which (taking into account the cost of achieving reductions and environmental impacts and energy requirements) EPA determines has been adequately demonstrated.	*o*-Dichlorobenzene is subject to the NSPS for equipment leaks of volatile organic compounds (VOCs) in the synthetic organic chemicals manufacturing industry for which construction, reconstruction or modification began after January 5, 1981 and on or before November 7, 2006; after November 7, 2006 and on or before April 25, 2023; and after April 25, 2023 (40 CFR Part 60, Subparts VV, VVa, and VVb).
Clean Air Act (CAA) – sections 211(a), (b), (e), and (f)	Requires fuels and fuel additives that are designated by EPA to be registered under 40 CFR Part 79, Registration of Fuels and Fuel Additives.	While the composition of registered fuels and fuel additives is confidential, a safety data sheet for a fuel additive identified *p*-dichlorobenzene and *o*- dichlorobenzene as components (List of Registered Gasoline and Diesel Additives, Accessed June 4, 2020).
Clean Water Act (CWA) section 304(a)(1)	Requires EPA to develop and publish ambient water quality criteria (AWQC) reflecting the latest scientific knowledge on the effects on human health that may be expected from the presence of pollutants in any body of water.	In 2015 EPA published updated AWQC for *o*-dichlorobenzene, including a recommendation of 1,000 (µg/L) for “Human Health for the consumption of Water + Organism” and 3,000 (µg/L) for “Human Health for the consumption of Organism Only” that states and authorized tribes may consider when adopting criteria into their water quality standards. (National Recommended Water Quality Criteria – Human Health Criteria Table, Accessed May 20, 2020)

Statute	General Description of Authority or Regulation	Chemical-Specific Summary
Clean Water Act (CWA) – sections 301, 304, 306, 307, and 402	Clean Water Act section 307(a) establishes a list of toxic pollutants or combination of pollutants under the CWA. The statute specifies a list of families of toxic pollutants also listed in the Code of Federal Regulations at 40 CFR 401.15. The "priority pollutants" specified by those families are listed in 40 CFR Part 423 Appendix A. These are pollutants for which best available technology effluent limitations must be established on either a national basis through rules (Sections 301(b), 304(b), 307(b), 306) or on a case-by-case best professional judgement basis in NPDES permits, see Section 402(a)(1)(B). EPA identifies the best available technology that is economically achievable for that industry after considering statutorily prescribed factors and sets regulatory requirements based on the performance of that technology.	*o*-Dichlorobenzene is designated as a toxic pollutant under Section 307(a)(1) of the CWA and as a priority pollutant, and as such is subject to effluent limitations and any associated monitoring requirements of NPDES permits (40 CFR 401.15; 40 CFR Part 423 Appendix A). Under CWA Section 304, *o*-dichlorobenzene is included in the list of total toxic organics (TTO) for at least one point source category (Electroplating (40 CFR 413.02(i)); Metal Finishing (40 CFR 433.11(e); Electrical and electric components including semiconductors (40 CFR 469.12(a)) and electronic crystals (40 CFR 469.22(a))).
Clean Water Act (CWA) – section s311(b)(2)(A) and 501(a) of the Federal Water Pollution Control Act.	Requires EPA to develop, promulgate, and revise as may be appropriate, regulations designating as hazardous substances, other than oil, which, when discharged present an imminent and substantial danger to the public health or welfare, including, but not limited to, fish, shellfish, wildlife, shorelines, and beaches.	*o*-Dichlorobenzene is a designated hazardous substance in accordance with Section 311(b)(2)(A) of the Federal Water Pollution Control Act (40 CFR Section 116.4, see 43 FR 10474 (March 13, 1978)).
Safe Drinking Water Act (SDWA) – section 1412	Requires EPA to publish a non-enforceable maximum contaminant level goal (MCLG) for a contaminant for which EPA makes the determination that the contaminant: 1. may have an adverse effect on the health of persons; 2. is known to occur or there is a substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern; and 3. in the sole judgement of the Administrator, regulation of the contaminant presents a meaningful opportunity for health risk reductions for persons served by public water systems. When EPA publishes an MCLG, EPA must also promulgate a National Primary Drinking Water Regulation (NPDWR) which includes either an enforceable maximum contaminant level (MCL), or a required treatment technique. Public water systems are required to comply with NPDWRs.	*o*-Dichlorobenzene is subject to NPDWR under the SDWA with a MCLG of 0.6 mg/L Public Health Goal and an enforceable MCL of 0.6 mg/L (Section 1412) (40 CFR Part 141) (56 FR 3526, January 30, 1991).
Resource Conservation and Recovery Act (RCRA) – section 3001	Directs EPA to develop and promulgate criteria for identifying the characteristics of hazardous waste, and for listing hazardous waste, taking into account toxicity, persistence, and degradability in nature, potential for accumulation in tissue and other related factors	*o*-Dichlorobenzene is included on the list of hazardous wastes pursuant to RCRA 3001. RCRA Hazardous Waste Code U070 (40 CFR Section 261.33).

Statute	General Description of Authority or Regulation	Chemical-Specific Summary
	such as flammability, corrosiveness, and other hazardous characteristics.	
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) – sections 102(a) and 103	Authorizes EPA to promulgate regulations designating as hazardous substances those substances which, when released into the environment, may present substantial danger to the public health or welfare or the environment. EPA must also promulgate regulations establishing the quantity of any hazardous substance the release of which must be reported under Section 103, which also requires persons in charge of vessels or facilities to report to the National Response Center if they have knowledge of a release of a hazardous substance above the reportable quantity threshold.	*o*-Dichlorobenzene is a hazardous substance under CERCLA. Releases of in excess of 100 lb must be reported (40 CFR 302.4).
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) - section 104(i), as amended by the Superfund Amendments and Reauthorization Act (SARA)	Amendments made several important changes to CERCLA, for example: requires the Agency to revise the hazardous ranking system and update the National Priorities List of hazardous waste sites, increases state and citizen involvement in the Superfund program and provides new enforcement authorities and settlement tools.	*o*-Dichlorobenzene is listed on the Substance Priority List. This list includes substances most commonly found at facilities on the CERCLA National Priorities List (NPL) that have been deemed to pose the greatest threat to public health
Other federal statutes/regulations		
Federal Food, Drug and Cosmetic Act (FFDCA)	Provides the FDA with authority to oversee the safety of food, drugs and cosmetics, except residues of pesticides in food are regulated by EPA under FFDCA section 408 (discussed above where applicable).	The FDA regulates *o*-dichlorobenzene in bottled water. The maximum permissible level of *o*-dichlorobenzene as a contaminant is 0.6 mg/L (21 CFR 165.110). FDA lists a Cumulative Estimated Daily Intake (CEDI) value of 0.35 µg/kg bw/d and a Cumulative Dietary Concentration (CDC) value of 7 ppb (date calculated/updated Sep 9, 2002).

Statute	General Description of Authority or Regulation	Chemical-Specific Summary
Occupational Safety and Health Act (OSH Act)	Requires employers to provide their workers with a place of employment free from recognized hazards to safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress or unsanitary conditions (29 U.S.C Section 651 et seq.). Under the Act, OSHA can issue occupational safety and health standards including such provisions as Permissible Exposure Limits (PELs), exposure monitoring, engineering and administrative control measures, and respiratory protection.	OSHA issued occupational safety and health standards for *o*-dichlorobenzene that included a PEL of (C)50ppm (ceiling limit), exposure monitoring, control measures, and respiratory protection (29 CFR 1910.1000).
Federal Hazardous Materials Transportation Act (HMTA)	Section 5103 of the Act directs the Secretary of Transportationto: • Designate material (including an explosive, radioactive material, infectious substance, flammable or combustible liquid, solid or gas, toxic, oxidizing or corrosive material, and compressed gas) as hazardous when the Secretary determines that transporting the material in commerce may pose an unreasonable risk to health and safety or property. • Issue regulations for the safe transportation, including security, of hazardous material in intrastate, interstate and foreign commerce.	*o*-Dichlorobenzene is listed as a hazardous material with regard to transportation and is subject to regulations prescribing requirements applicable to the shipment and transportation of listed hazardous materials (49 CFR 172.101; 70 FR 34381, June 14, 2005).
All hyperlinks in table were accessed August 5, 2026.		

B.2 State Laws and Regulations

Table_Apx B-2. State Laws and Regulations

General Description of Authority or Regulation		Chemical-Specific Summary
State Air Regulations	Maryland (MD Title 26, Part 2, Subtitle 11, Chapter 26.11.16).	State Class II Toxic Air Pollutants Requiring Emission Estimates or Ambient Impact Analysis by Existing Sources.
	Massachusetts Allowable Ambient Level (AAL) (310 CMR 6.00: Ambient Air Quality Standards).	Annual average AAL of 0.1 $\mu g/m^3$
	New Hampshire Allowable Ambient Level (AAL) (Env-A 1400: Regulated Toxic Air Pollutants).	24-h AAL at 536 $\mu g/m^3$ Annual AAL at 357 $\mu g/m^3$
	New York Annual Guideline Concentration (AGC) (6 NYCRR Part 212).	AGC of 200 $\mu g/m^3$
	Rhode Island Acceptable Ambient Level (AAL) (Air Pollution Regulation No. 22).	1-hour AAL at 2,000 $\mu g/m^3$ Annual AAL at 300 $\mu g/m^3$

General Description of Authority or Regulation		Chemical-Specific Summary
	Wisconsin (ch. NR 445.07, Wis. Adm. Code).	24-hour Ambient Air Standard of 3,608 µg/m^3
State Drinking Water Standards and Guidelines	Arizona Maximum Contaminant Levels (MCLs) (14 Ariz. Admin. Register 2978, August 1, 2008).	MCL of 0.6 mg/L MCLG of 0.6 mg/L
	California Maximum Contaminant Levels (MCLs) and Public Health Goals (PHGs) (Cal Code Regs. Title 26, § 22-64444).	MCL of 0.6 mg/L PHG of 0.6 mg/L in 1997
	Connecticut Maximum Contaminant Levels (MCLs) (Conn. Agencies Regs. § 19-13-B102).	MCL of 0.6 mg/L
	Delaware Maximum Contaminant Levels (MCLs) (Del. Admin. Code Title 16, § 4462).	
	Florida Maximum Contaminant Levels (MCLs) (Fla. Admin. Code R. Chap. 62-550).	
	Maine Maximum Contaminant Levels (MCLs) (10 144 Me. Code R. Chap. 231).	
	Massachusetts Maximum Contaminant Levels (MCLs) (310 Code Mass. Regs. § 22.00).	
	Michigan Maximum Contaminant Levels (MCLs) (Mich. Admin. Code r.299.44 and r.299.49, 2017).	MCL of 600 µg/L
	Minnesota Maximum Contaminant Levels (MCLs) (Minn R. Chap. 4720).	
	New Jersey Maximum Contaminant Levels (MCLs) (N.J. Admin. Code 7:10 § 5.2)	
	Pennsylvania Maximum Contaminant Levels (MCLs) (25 Pa. Code § 109.202).	MCL of 0.6 mg/L
	Rhode Island Maximum Contaminant Levels (MCLs) (Rules and Regulations Pertaining to Public Drinking Water R46-13-DWQ).	
State PELs	California (Cal Code Regs. Title 8, § 5155)	PEL of 25 ppm, 150 mg/m^3, and 50 ppm (ceiling)
	Hawaii (Hawaii Administrative Rules Section 12-60-50).	PEL of 50 ppm (ceiling) and 300 mg/m^3 (ceiling)
	Massachusetts Threshold Effect Exposure Limit (TEL) and Non-Threshold Effects Exposure Limit (NTEL) (310 CMR 6.00: Ambient Air Quality Standards).	24-hour average TEL of 10 µg/m^3 Annual average NTEL of 0.1 µg/m^3
	Oregon (Administrative Rules 437-002-0382).	PEL of 50 ppm (ceiling) and 300 mg/m^3 (ceiling)
	Washington (Admin. Code WAC 296-841-20025).	PEL of 50 ppm (ceiling)
State Right-to-Know Acts		Massachusetts (105 Code Mass. Regs. § 670.000 Appendix A), New Jersey

General Description of Authority or Regulation	Chemical-Specific Summary
	(N.J.A.C. 7:1G), and Pennsylvania (P.L. 734, No. 159 and 34 Pa. Code § 323).
Chemicals of High Concern to Children	Several states have adopted reporting laws for chemicals in children's products containing *o*-dichlorobenzene including Maine (38 MRSA Chapter 16-D).
Other	*o*-Dichlorobenzene is on the MA Toxic Use Reduction Act (TURA) list of April 3, 2019 (301 CMR 41.00).
All hyperlinks in this table were accessed August 5, 2026	

B.3 International Laws and Regulations

Table_Apx B-3. International Laws and Regulations

Country/ Organization	Requirements and Restrictions	Chemical-Specific Summary
Canada	*o*-Dichlorobenzene is on the Domestic Substances List (Government of Canada. Managing substances in the environment. Substances Search. Accessed April 7, 2026). Other regulations include: Canada's National Pollutant Release Inventory (NPRI)	TLV-TWA of 25 ppm TLV-STEL of 50 ppm
European Union	*o*-Dichlorobenzene was evaluated under the 2013 Community rolling action plan (CoRAP) under regulation (European Commission [EC]) No1907/2006 – REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) (ECHA database. Accessed April 7, 2026).	LTEL of 20 ppm STEL of 50 ppm
Australia	*o*-Dichlorobenzene is subject to secondary notifications when importing or manufacturing the chemical in Australia. In 2001, *o*-dichlorobenzene was assessed (*o*-Dichlorobenzene. Priority Existing Chemical No. 14. Full Public Report (2001)).	TWA of 25 ppm STEL of 50 ppm
Japan	*o*-Dichlorobenzene is regulated in Japan under the following legislation: • Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. (Chemical Substances Control Law; CSCL) • Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof • Industrial Safety and Health Act (ISHA) • Japan Air Pollution Control Law (National Institute of Technology and Evaluation [NITE] Chemical Risk Information Platform [CHIRP], Accessed July 8, 2026).	TWA of 25 ppm

Country/ Organization	Requirements and Restrictions	Chemical-Specific Summary
Institute for Occupational Safety and Health of the German Social Accident Insurance (GESTIS) international limit values for chemical agents (Occupational exposure limits, OELs). Accessed April 7, 2026.	Australia, Canada-Ontario, Canada- Québec, Singapore, South Korea, United Kingdom	TWA of 25 ppm STEL of 50 ppm
	Austria, Belgium, European Union, France, Hungary, Ireland, Italy, Latvia, Norway, Romania, Spain, Sweden	TWA of 20 ppm STEL of 50 ppm
	Denmark,	TWA of 20 ppm STEL of 40 ppm
	Finland	TWA of 10 ppm STEL of 50 ppm
	Germany (AGS), Germany (DFG), New Zealand, Switzerland	TWA of 10 ppm STEL of 20 ppm
	Japan (JSOH), Japan (MHLW)	TWA of 25 ppm
	People's Republic of China	TWA of 50 mg/m^3 STEL of 100 mg/m^3
	Poland	TWA of 90 mg/m^3 STEL of 180 mg/m^3
	South Africa	TWA of 50 ppm STEL of 100 ppm
	The Netherlands	TWA of 20 ppm STEL of 49 ppm
All hyperlinks in this table were accessed August 5, 2026		

B.4 Assessment History

Table_Apx B-4. Assessment History of *o*-Dichlorobenzene

Authoring Organization	Publication
EPA publications	
U.S. EPA, Office of Research and Development	*Integrated Risk Information System (IRIS): 1,2-Dichlorobenzene (o-dichlorobenzene)*. (1987). Toxicological Review of 1,2-Dichlorbenzene (CAS No. 95-50-1). In support of Summary Information on the Integrated Risk Information System EPA/635/R-03/014 (2006)
U.S. EPA, Office of Water	*Health Advisory for 1,2-Dichlorobenzene*. (1987)
U.S. EPA, Office of Water	*Ambient Water Quality Criteria for Dichlorobenzenes*. EPA-440/5-80-039. (1980)
Other U.S.-based organizations	
Agency for Toxic Substances and Disease Registry (ATSDR)	*Toxicological Profile for Dichlorobenzenes (1,2-, 1,3-, and 1,4-Dichlorobenzene)*. (2006)
National Toxicology Program (NTP)	*Toxicology and Carcinogenesis Studies of 1,2-Dichlorobenzene (CAS No. 95-50-1)*. NTP Technical Report Series No. 255. (1985)
California Office of Environmental Health Hazard Assessment (OEHHA)	*Public Health Goal for 1,2-Dichlorobenzene in Drinking Water*. (2000)

Authoring Organization	Publication
National Institute for Occupational Safety and Health (NIOSH)	*NIOSH Pocket Guide to Chemical Hazards: o-Dichlorobenzene*. (1994)
American Conference of Governmental Industrial Hygienists (ACGHI)	*Documentation of the Threshold Limit Values and Biological Exposure Indices: o-Dichlorobenzene*. (2001)
International	
Organisation for Economic Co-operation and Development (OECD), Cooperative Chemicals Assessment Program (CoCAP)	1,*2-Dichlorobenzene: SIDS Initial Assessment Profile* OECD (2011b)
World Health Organization (WHO)	*Environmental Health Criteria 128: Chlorobenzenes other than Hexachlorobenzene*. International Programme on Chemical Safety (IPCS) (1991)
European Union Risk Assessment, European Chemicals Bureau	*European Union Risk Assessment Report: 1,2-Dichlorobenzene*. (2004)
European Chemicals Agency (ECHA)	*1,2-Dichlorobenzene Registration Dossier.* Under REACH Regulation (EC) No. 1907/2006.

Appendix C LIST OF TECHNICAL SUPPORT DOCUMENTS AND SUPPLEMENTAL FILES

This appendix provided the name and citation for all technical support documents and supplemental files included in this *Risk Evaluation for o-Dichlorobenzene* (document "01"). These include discipline-specific assessments, systematic review results, risk calculations, modeling outputs, and public communication documents. Files are numbered to correspond with the filenames uploaded to the docket: EPA-HQ-OPPT-2018-0444

Systematic Review Protocol and Data Quality Evaluation and Data Extraction Documents – Provide additional detail and information on systematic review methodologies used as well as the data quality evaluations and extractions criteria and results.

04. *Draft Data Quality Evaluation Information for Human Health Hazard Animal Toxicology for o-Dichlorobenzene* (U.S. EPA, 2026s) – Provides a compilation of tables for the data quality evaluation information for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was evaluated from a data source that has information relevant for the evaluation of human health hazard animal toxicity information.

05. *Draft Data Quality Evaluation Information for Human Health Hazard Epidemiology for o-Dichlorobenzene* (U.S. EPA, 2026t) – Provides a compilation of tables for the data quality evaluation information for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was evaluated from a data source that has information relevant for the evaluation of epidemiological information.

06. *Draft Data Quality Evaluation Information for Environmental Hazard for o-Dichlorobenzene* (U.S. EPA, 2026q) – Provides a compilation of tables for the data quality evaluation information for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was evaluated from a data source that has information relevant for the evaluation of environmental hazard toxicity information.

07. *Draft Data Quality Evaluation and Data Extraction Information for Dermal Absorption for o-Dichlorobenzene* (U.S. EPA, 2026a) – Provides a compilation of tables for the data extraction and data quality evaluation information for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was extracted and evaluated from a data source that has information relevant for the evaluation for dermal absorption.

08. *Draft Data Extraction Information for Environmental Hazard and Human Health Hazard Animal Toxicology and Epidemiology for o-Dichlorobenzene* (U.S. EPA, 2026l) – Provides a compilation of tables for the data extraction for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was extracted from a data source that has information relevant for the evaluation of environmental hazard and human health hazard animal toxicology and epidemiology information.

31. *Draft Systematic Review Protocol for o-Dichlorobenzene* (U.S. EPA, 2026ae) – Describes some clarifications and different approaches that were implemented than those described in the 2021 Draft Systematic Review Protocol in response to (1) SACC comments, (2) public comments, or (3) to reflect chemical-specific risk evaluation needs. This supplemental file may also be referred to as the "*o*-Dichlorobenzene Systematic Review Protocol."

32. *Draft Data Quality Evaluation and Data Extraction Information for Physical and Chemical Properties for o-Dichlorobenzene* (U.S. EPA, 2026p) – Provides a compilation of tables for the data extraction and data quality evaluation information for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was extracted and evaluated from a data source that has information relevant for the evaluation of physical and chemical properties.

33. *Draft Data Quality Evaluation and Data Extraction Information for Environmental Fate and Transport for o-Dichlorobenzene* (U.S. EPA, 2026n) – Provides a compilation of tables for the data extraction and data quality evaluation information for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was extracted and evaluated from a data source that has information relevant for the evaluation for environmental fate and transport.

34. *Draft Data Quality Evaluation and Data Extraction Information for Environmental Release and Occupational Exposure for o-Dichlorobenzene* (U.S. EPA, 2026o) – Provides a compilation of tables for the data extraction and data quality evaluation information for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was extracted and evaluated from a data source that has information relevant for the evaluation of environmental release and occupational exposure.

35. *Draft Data Quality Evaluation Information for General Population, Consumer, and Environmental Exposure for o-Dichlorobenzene* (U.S. EPA, 2026r) – Provides a compilation of tables for the data quality evaluation information for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was evaluated from a data source that has information relevant for the evaluation of general population, consumer, and environmental exposure.

36. *Draft Data Extraction Information for General Population, Consumer, and Environmental Exposure for o-Dichlorobenzene* (U.S. EPA, 2026m) – Provides a compilation of tables for the data extraction for *o*-dichlorobenzene. Each table shows the data point, set, or information element that was extracted from a data source that has information relevant for the evaluation of general population, consumer, and environmental exposure.

Associated **Technical Support Documents** (TSDs) – Additional details and information on physical chemistry, fate, exposure, hazard, and risk assessments.

03. *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f)

02. *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w)

11. *Draft Transcriptomic Assessment for o-Dichlorobenzene and p-Dichlorobenzene* (U.S. EPA, 2026aj)

Supplemental Files – Additional details and information on physical chemistry, fate, release, exposure, hazard, and risk assessments.

09. *Draft Benchmark Dose Modeling Results for o-Dichlorobenzene* (U.S. EPA, 2026d)

10. *Draft Candidate Analog and Toxicity Values to Support ReCAAP Analysis for o-Dichlorobenzene* (U.S. EPA, 2026e)

12. *Draft Air Quality System (AQS) Monitoring Data 2019 to 2023 for o-Dichlorobenzene* (U.S. EPA, 2026b)

13. *Draft Integrated Indoor Outdoor Air Calculator (IIOAC) TRI 2019-2023 Exposure and Risk Analysis for o-Dichlorobenzene* (U.S. EPA, 2026x)

14. *Draft Water Quality Portal Results for o-Dichlorobenzene and p-Dichlorobenzene* (U.S. EPA, 2026af)

15. *Draft Air Release Summary and Statistics for NEI and TRI o-Dichlorobenzene* (U.S. EPA, 2026c)

16. *Draft Water Release Summary for DMR and TRI o-Dichlorobenzene* (U.S. EPA, 2026ag)

17. *Draft Land Release Summary for TRI o-Dichlorobenzene* (U.S. EPA, 2026y)

18. *Draft Occupational Risk Calculator o-Dichlorobenzene* (U.S. EPA, 2026ac)

19. *Draft Inhalation Exposure Summary for o-Dichlorobenzene* (U.S. EPA, 2026ab)

20. *Draft Consumer Model Results for o-Dichlorobenzene* (U.S. EPA, 2026k)

21. *Draft Consumer Inhalation and Dermal Risk Calculator for o-Dichlorobenzene* (U.S. EPA, 2026j)

22. *Draft Dermal Modeling Results (liquid) for o-Dichlorobenzene* (U.S. EPA, 2026u)

25. *Draft Lubricants & Greases Inhalation Exposure Model for o-Dichlorobenzene* (U.S. EPA, 2026z)

26. *Draft Number of Workers for o-Dichlorobenzene* (U.S. EPA, 2026aa)

27. *Draft Commercial Inhalation and Dermal Risk Calculator for o-Dichlorobenzene* (U.S. EPA, 2026h)

28. *Draft Commercial Model Results for o-Dichlorobenzene* (U.S. EPA, 2026i)

29. *Draft Fuels and Related Products Results for o-Dichlorobenzene* (U.S. EPA, 2026v)

30. *Draft Paints and Coatings Results for o-Dichlorobenzene* (U.S. EPA, 2026ad)

37. *Masterlist: o-Dichlorobenzene Product Concentration* (U.S. EPA, 2026ah)

Appendix D UPDATES TO THE *o*-DICHLOROBENZENE CONDITIONS OF USE TABLE

D.1 Additions and Name Changes to Conditions of Use Based on Updated 2020 CDR

D.2 Reported Data and Stakeholder Engagement

After publication of the final scope document (U.S. EPA, 2020d), EPA received updated submissions under the 2020 CDR reported data, and some industry code names and product categories were updated for the 2020 CDR reporting cycle. The Agency also improved the Agency's understanding of the COUs through further outreach and public comments. EPA received information from stakeholders clarifying certain conditions of use of *o*-dichlorobenzene. Therefore, EPA is amending the description of certain *o*-dichlorobenzene COUs based on that outreach and those new submissions, as well as to clarify COU subcategories assessed and simplify COU names where appropriate.

Table_Apx D-1 summarizes the changes to the COUs based on the new reporting codes in the 2020 CDR and any other new information since the publication of the final scope.

These COU descriptions incorporate CDR submissions from the 2016 and 2020 CDR cycles. Preliminary 2024 CDR cycle submissions were reviewed to evaluate whether the 2024 CDR cycle would further inform these COUs. EPA intends to further review and incorporate 2024 CDR data into the final risk evaluation. If EPA receives new information on the *o*-dichlorobenzene COUs during the comment period for the draft risk evaluation, then that information will be considered and if appropriate, incorporated into the final COUs.

Table_Apx D-1. Additions and Name Changes to Categories and Subcategories of Conditions of Use for *o*-Dichlorobenzene Based on CDR Reporting and Stakeholder Engagement

Life Cycle Stage and Category	Original Subcategory in the Final Scope Document	Occurred Change	Revised Life Cycle Stage, Category and Subcategory in the 2026 Draft Risk Evaluation
Manufacture – Domestic manufacture	Not included	Added "Manufacture – Manufacture – Domestic Manufacture" category and subcategory after receiving information that the chemical is domestically manufactured as a byproduct.	Manufacture – Domestic manufacture – N/A
Processing – Processing as a reactant	In all other chemical product and preparation manufacturing	Consolidated industry sector into the description of the category.	Processing – Processing as a reactant – N/A
Processing – Incorporation into a formulation, mixture, or reaction product	Solvents (which become part of product formulation or mixture) in Plastic material and resin manufacturing); Petroleum lubricating oil and grease manufacturing; All	Consolidated sectors in the subcategory "in Plastic material and resin manufacturing); Petroleum lubricating oil and grease manufacturing; All other chemical product and	Processing – Incorporation into formulation, mixture, or reaction product – Solvents (which become part of a formulation or mixture)

Life Cycle Stage and Category	Original Subcategory in the Final Scope Document	Occurred Change	Revised Life Cycle Stage, Category and Subcategory in the 2026 Draft Risk Evaluation
	other chemical product and preparation manufacturing	preparation manufacturing" into the description of the subcategory.	
Processing – Incorporation into a formulation, mixture, or reaction product	Processing aid in Soap, cleaning compound, and toilet preparation manufacturing	Removed "Processing aid" from the subcategory based on stakeholder input.	Processing – Incorporation into a formulation, mixture, or reaction product – Soap, cleaning compound, and toilet preparation manufacturing
Processing – Repackaging	Not included	Added "Processing - Repackaging" category to account for the transfer of *o*-dichlorobenzene from one container to another.	Processing – Repackaging – N/A
Industrial use – Solvents (which become part of product formulation or mixture)	Printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing; All other basic organic chemical manufacturing	Removed "All other basic organic chemical manufacturing" subcategory based on stakeholder input.	Industrial use – Solvents (which become part of product formulation or mixture) – Printing ink manufacturing; Paint and coating manufacturing; Synthetic dye and pigment manufacturing
Industrial use – Non-incorporative activities	Not included	Added "Non-incorporative activities" category and "Processing aids, not otherwise listed" subcategory based on stakeholder comment.	Industrial use – Non-incorporative activities – Processing aids, not otherwise listed
Commercial use – Lubricants and greases	Lubricants and greases (*e.g.*, oil additives, degreasers, penetrant for pneumatic tools)	Consolidated parenthetical "(*e.g.*, oil additives, degreasers, penetrant for pneumatic tools)" into the description of the category to simplify the name of the condition of use. Removed "degreasers" based on CDR.	Commercial use - Lubricants and greases – N/A
Commercial use – Fuels and related products	Fuel additive for gasoline and diesel	Consolidated "for gasoline and diesel" into the description of the subcategory to simplify the name of the condition of use.	Commercial use - Fuels and related products - Fuel additive
Commercial use – Air care products	Continuous action air fresheners (including toilet/urinal deodorizers/fresheners)	Consolidated "including toilet/urinal deodorizers/ fresheners" into the description of the subcategory to clarify that EPA assessed the whole subcategory.	Commercial use – Air care products – Continuous action air fresheners

Life Cycle Stage and Category	**Original Subcategory in the Final Scope Document**	**Occurred Change**	**Revised Life Cycle Stage, Category and Subcategory in the 2026 Draft Risk Evaluation**
Commercial use – Other use	*e.g.,* Laboratory chemicals; Sheep-branding fluid; Cleaning and furnishing care products	Removed "*e.g.*" to simplify the name of the condition of use and moved "Sheep-branding fluid" into description of "paints and coatings" subcategory.	Commercial use – Other use – Laboratory chemicals; Cleaning and furnishing care products
Consumer use – Paints and coatings	Not included	Added consumer "Paints and coatings" category and moved subcategory "Sheep-branding fluid" and "Thinners" from "Other use" to paints and coatings category.	Consumer use – Paints and coatings – Thinners, sheep-branding fluid
Consumer use – Lubricants and greases	Lubricants and greases (*e.g.*, oil additives, degreasers, penetrant for pneumatic tools)	Consolidated "oil additives, degreasers, penetrant for pneumatic tools" into the description of the subcategory.	Consumer use – Lubricants and greases – N/A
Consumer use – Fuels and related products	Fuel additive for gasoline and diesel	Consolidated "for gasoline and diesel" into the description of the subcategory to simplify the name of the condition of use.	Consumer use – Fuels and related products – Fuel additive
Consumer use – Air care products	Continuous action air fresheners (including toilet/urinal deodorizers/fresheners)	Consolidated "including toilet/urinal deodorizers/fresheners" into the description of the subcategory to simplify the name of the condition of use.	Consumer use – Air care products – Continuous action air fresheners
Consumer use – Other use	*e.g.*, Thinners (Products for cleaning brushes and tools used with overglazes); Ceramics glaze; Sheep-branding fluid; Cleaning and furnishing care products	Changed "*e.g.*" to "including." Moved sheep-branding fluid and thinners into paints and coatings subcategory and incorporated "(Products for cleaning brushes and tools used with overglazes)" into description of that subcategory to simplify the name of the condition of use.	Consumer use – Other use – Other use including ceramics glaze, and cleaning and furnishing care products

Appendix E CONDITIONS OF USE DESCRIPTIONS

The following descriptions are intended to include examples of uses, so as not to exclude other activities that may also be included in the conditions of use of the chemical substance. To better describe the conditions of use, EPA considered CDR submissions from recent CDR cycles for *o*-dichlorobenzene (CASRN 95-50-1) as well as stakeholder input, and the descriptions reflect what EPA identified as the best fit for that submission. Examples of products or activities are included in the following descriptions to help describe the conditions of use but are not exhaustive.

E.1 Manufacture – Domestic Manufacture

Domestic manufacture means to manufacture or produce *o*-dichlorobenzene within the United States, including to manufacture *o*-dichlorobenzene as a byproduct.

E.2 Manufacturing – Import

This condition of use refers to the import of *o*-dichlorobenzene, including *o*-dichlorobenzene-containing products (including those with *o*-dichlorobenzene as a trace amount or as an impurity), into the customs territory of the United States. This condition of use includes loading/unloading and repackaging (but not transport) associated with the import of *o*-dichlorobenzene. In general, chemicals may be imported into the United States in bulk via water, air, land, and intermodal shipments.

E.3 Processing – As a Reactant

This condition of use refers to the use of previously manufactured *o*-dichlorobenzene as a feedstock in the production of another chemical via a chemical reaction in which *o*-dichlorobenzene is consumed to form the product. This includes but is not limited to use in all other basic chemical manufacturing.

E.4 Processing – Incorporation into a Formulation, Mixture, or Reaction Product – Intermediates in All Other Basic Organic Chemical Manufacturing

This condition of use refers to the preparation of a product; that is, the incorporation of *o*-dichlorobenzene into a formulation, mixture, or a reaction product that occurs when a chemical substance is added to a product (or product mixture) after its manufacture, for distribution in commerce—in this case as an intermediate in all other basic organic chemical manufacturing.

E.5 Processing – Incorporation into a Formulation, Mixture, or Reaction Product – Solvents (Which Become Part of Product Formulation or Mixture)

This condition of use refers to the preparation of a product; that is, the incorporation of *o*-dichlorobenzene into a formulation, mixture, or a reaction product that occurs when a chemical substance is added to a product (or product mixture) after its manufacture, for distribution in commerce—in this case as a solvent (which become part of product formulation or mixture) in plastic material and resin manufacturing, petroleum lubricating oil and grease manufacturing, and other chemical product and preparation manufacturing. This includes lubricants and greases, as well as fuels additives, for consumer or commercial use.

E.6 Processing – Incorporation into a Formulation, Mixture, or Reaction Product – Soap, Cleaning Compound, and Toilet Preparation Manufacturing

This condition of use refers to the preparation of a product; that is, the incorporation of *o*-dichlorobenzene into a formulation, mixture, or a reaction product that occurs when a chemical substance is added to a product (or product mixture) after its manufacture, for distribution in commerce—in this case in soap, cleaning compound, and toilet preparation manufacturing. This includes, but is not limited to, products in which *o*-dichlorobenzene is used to control, remove, mask, or impart odors.

E.7 Processing – Repackaging

This condition of use refers to the preparation of *o*-dichlorobenzene for distribution into commerce in a different form (concentration change), state (solid, liquid, gas), or quantity than originally received or stored including chemical product and preparation manufacturing, wholesale and retail trade, and laboratory chemicals manufacturing. This condition of use includes transferring *o*-dichlorobenzene from a bulk storage container into smaller containers. The type and size of container varies depending on customer requirement. This condition of use would not apply to the relabeling or redistribution of a chemical substance without removing the chemical substance from the original container in which it was supplied.

E.8 Processing – Recycling

This condition of use refers to the process of treating generated waste streams (*i.e.,* which would otherwise be disposed of as waste), containing *o*-dichlorobenzene, that are collected, either on-site or transported to a third-party site, for commercial purpose.

E.9 Distribution in Commerce

Under TSCA, "distribution in commerce" and "distribute in commerce" are defined under TSCA section 3(5): "The terms 'distribute in commerce' and 'distribution in commerce' when used to describe an action taken with respect to a chemical substance or mixture or article containing a substance or mixture mean to sell, or the sale of, the substance, mixture, or article in commerce; to introduce or deliver for introduction into commerce, or the introduction or delivery for introduction into commerce of, the substance, mixture, or article; or to hold, or the holding of, the substance, mixture, or article after its introduction into commerce." In this draft risk evaluation, distribution in commerce includes the transportation associated with the moving of *o*-dichlorobenzene or *o*-dichlorobenzene-containing products from manufacturing sites to downstream processing and repackaging sites, to final use sites, and/or for final disposal of *o*-dichlorobenzene or *o*-dichlorobenzene-containing products. *o*-Dichlorobenzene may be transported in pure liquid form and in various liquid formulations with a range of potential *o*-dichlorobenzene concentrations.

E.10 Industrial Use – Solvents (Which Become Part of Product Formulation or Mixture) – Printing Ink Manufacturing; Paint and Coating Manufacturing; Synthetic Dye and Pigment Manufacturing

This condition of use refers to the industrial use of *o*-dichlorobenzene added to a product (or product mixture) in an industrial setting, specifically printing ink manufacturing, paint and coating manufacturing, and synthetic dye and pigment manufacturing. This condition of use refers to *o*-dichlorobenzene as it is used in the industrial sector as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.11 Industrial Use – Functional Fluids (Closed System) – All Other Basic Organic Chemical Manufacturing

This condition of use refers to the industrial use of *o*-dichlorobenzene in a closed system to transmit or remove heat from another material. This condition of use refers to *o*-dichlorobenzene as it is used in the industrial sector as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.12 Industrial Use – Non-Incorporative Activities – Processing Aids, Not Otherwise Listed

This condition of use refers to the industrial use of *o*-dichlorobenzene to improve the processing characteristics or the operation of process equipment when added to a process or to a substance or mixture to be processed. *o*-Dichlorobenzene does not become a part of the reaction product nor has function in the reaction product. This condition of use refers to *o*-dichlorobenzene as it is used in the industrial sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.13 Commercial Use – Ink, Toner, and Colorant Products – Ink and Toners

This condition of use refers to the commercial use of *o*-dichlorobenzene in ink, toners and colorants used for writing, printing, creating an image on paper and other substrates, or applied to substrates to change their color or hide images. This condition of use refers to *o*-dichlorobenzene as it is used in the commercial sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.14 Commercial Use – Paints and Coatings – Coatings and Paints, Thinners, Paint Removers

This condition of use refers to the commercial use of *o*-dichlorobenzene in paints and coatings, thinners, and paint removers. This condition of use includes sheep-branding fluids and associated products. This condition of use refers to *o*-dichlorobenzene as it is used in the commercial sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.15 Commercial Use – Lubricants and Greases

This condition of use refers to the commercial use of *o*-dichlorobenzene in liquids or sprays that reduce friction, heat generation, and wear between surfaces. This includes greases and oils for engines, gears, and pneumatic tools. This condition of use refers to *o*-dichlorobenzene as it is used in the commercial sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.16 Commercial Use – Fuels and Related Products – Fuel Additive

This condition of use refers to the commercial use of *o*-dichlorobenzene in liquids added to fuels to improve properties such as stability, corrosion, oxygenation, and octane rating. This includes *o*-

dichlorobenzene-containing products which are added to gasoline and diesel fuel. This condition of use refers to *o*-dichlorobenzene as it is used in the commercial sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.17 Commercial Use – Air Care Products – Continuous Action Air Fresheners

This condition of use refers to the commercial use of *o*-dichlorobenzene in liquid, solid, and gel products and scented candle products that odorize or deodorize air in indoor environments. This includes garbage, toilet and urinal deodorizers and fresheners. This condition of use refers to *o*-dichlorobenzene as it is used in the commercial sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.18 Commercial Use – Other Use – Laboratory Chemical; Cleaning and Furnishing Care Products

This condition of use refers to the commercial use of *o*-dichlorobenzene in a laboratory for chemical analysis, chemical synthesis, extracting and purifying other chemicals, dissolving other substances, and similar activities. This condition of use refers to *o*-dichlorobenzene as it is used in the commercial sector, as opposed to when it is processed upstream (*e.g.*, when *o*-dichlorobenzene is repackaged for laboratory use). This condition of use also includes the commercial use of *o*-dichlorobenzene in cleaning and furnishing care products. This includes septic cleaner products. This condition of use refers to *o*-dichlorobenzene as it is used in the commercial sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is repackaged for laboratory use). EPA emphasizes that commercial use of *o*-dichlorobenzene as a laboratory chemical applies to research, government, and academic institutions, as well as to industrial and commercial laboratories.

E.19 Consumer Use – Paints and Coatings – Thinners, Sheep-branding Fluid

This condition of use refers to the consumer use of *o*-dichlorobenzene in paints and coatings, thinners, and paint removers. This condition of use includes the consumer use of *o*-dichlorobenzene in thinners, (including products for cleaning brushes and tools used with overglazes) and sheep-branding fluids and associated products. This condition of use refers to *o*-dichlorobenzene as it is used in the consumer sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.20 Consumer Use – Lubricants and Greases

This condition of use refers to the consumer use of *o*-dichlorobenzene in liquids that reduce friction, heat generation, and wear between surfaces. This includes greases and oils for engines, gears, and pneumatic tools. This condition of use refers to *o*-dichlorobenzene as it is used in the consumer sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is processed upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.21 Consumer Use – Fuels and Related Products – Fuel Additive

This condition of use refers to the consumer use of *o*-dichlorobenzene in liquids added to fuels to improve properties such as stability, corrosion, oxygenation, and octane rating. This includes *o*-dichlorobenzene-containing products which are added to gasoline and diesel fuel. This condition of use refers to *o*-dichlorobenzene as it is used in the consumer sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is used upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.22 Consumer Use – Air Care Products – Continuous Action Air Fresheners

This condition of use refers to the consumer use of *o*-dichlorobenzene in liquid, solid, and gel products and scented candle products that odorize or deodorize air in indoor environments. This includes garbage, toilet and urinal deodorizers and fresheners. This condition of use refers to *o*-dichlorobenzene as it is used in the consumer sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is used upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.23 Consumer Use – Other Use – Ceramics Glaze, and Cleaning and Furnishing Care Products

This condition of use refers to the consumer use of other products containing *o*-dichlorobenzene. This condition of use includes the consumer use of *o*-dichlorobenzene in ceramics glazes and cleaning and furnishing care products. This includes septic cleaner products. This condition of use refers to *o*-dichlorobenzene as it is used in the consumer sector as a component of a product (or product mixture), after it has already been incorporated into the product or mixture, as opposed to when it is used upstream (*e.g.,* when *o*-dichlorobenzene is processed into the product or mixture).

E.24 Disposal

Each of the conditions of use of *o*-dichlorobenzene may generate waste streams of the chemical that are collected and transported to third-party sites for disposal or treatment. Industrial sites that treat or otherwise dispose of wastes onsite that they themselves generate are assessed in each condition of use assessment (rather than as part of this condition of use). For purposes of the *o*-dichlorobenzene risk evaluation, this condition of use refers to the *o*-dichlorobenzene in a waste stream that is collected from facilities and commercial sites and is unloaded at and treated or disposed at third-party sites. This COU also includes *o*-dichlorobenzene contained in wastewater released from an occupational COU and discharged by occupational users to a POTW or other, non-POTW for treatment, as well as other wastes. Releases of *o*-dichlorobenzene are expected to occur to other environmental media, such as migration to water sources, through waste disposal (*e.g.*, disposal of formulations containing *o*-dichlorobenzene or transport containers). Disposal may also include destruction and removal by incineration. Recycling of *o*-dichlorobenzene and *o*-dichlorobenzene-containing products is considered a different COU. Environmental releases from manufacturing and processing sites that treat or dispose of onsite waste onsite are assessed in each COU.

Appendix F DRAFT OCCUPATIONAL EXPOSURE VALUE DERIVATION AND ANALYTICAL METHODS USED TO DETECT *o*-DICHLOROBENZENE

EPA has calculated a draft 8-hour time-weighted average (TWA) existing chemical occupational exposure value (OEV) to summarize the occupational exposure scenario and sensitive health endpoints into a single value. This draft calculated value may be used to support risk management efforts for *o*-dichlorobenzene under TSCA section 6(a), 15 U.S.C. §2605. EPA calculated the draft value rounded to 0.022 ppm (0.13 mg/m^3) for inhalation exposures to *o*-dichlorobenzene as an 8-hour TWA and for consideration in workplace settings (see Appendix F.1 below) based on the acute non-cancer human equivalent concentration (HEC) for respiratory toxicity.

TSCA requires risk evaluations to be conducted without consideration of cost and other non-risk factors, and thus this most sensitive occupational exposure value represents a risk-only number. If risk management for *o*-dichlorobenzene is implemented following the final risk evaluation, EPA may consider cost and other non-risk factors, such as technological feasibility, the availability of alternatives, and the potential for critical or essential uses. Any existing chemical exposure limit (ECEL) used for occupational safety risk management purposes could differ from the occupational exposure value presented in this appendix based on additional consideration of additional information, exposures, and non-risk factors consistent with TSCA section 6(c).

This draft calculated value for *o*-dichlorobenzene represents the exposure concentration below which exposed workers and occupational non-users are not expected to exhibit any appreciable risk of adverse toxicological outcomes. This value accounts for potentially exposed or susceptible subpopulations (PESS). The value is protective of all adverse human health effects (*i.e.*, respiratory toxicity) supported by the weight of scientific evidence in accordance with the best available science. This value (also the acute exposure value) is expressed relative to benchmarks and standard occupational scenario assumptions of 8 hours per day.

All hazard values used in these calculations are based on non-cancer HECs and associated uncertainty factor derivations from the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w). EPA expects that at the OEV of 0.022 ppm (0.13 mg/m^3), workers and occupational non-users also would be protected against respiratory toxicity resulting from occupational exposures. EPA has separately calculated a short-term occupational exposure value (STEV) of 0.14 ppm for 15-minute exposures to *o*-dichlorobenzene based on the same endpoint used for the OEV—though there is uncertainty in whether this adverse effect would present following only 15 minutes of exposure (see Section F.3 for details).

Of the identified occupational monitoring data for *o*-dichlorobenzene, workplace air concentrations have been measured below the calculated OEV, indicating that the OEV is achievable based on current workplace processes. A summary table of available monitoring methods from the Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), and EPA is included in Appendix F.2. The table presents validated methods from governmental agencies and is not intended to be a comprehensive list of available air monitoring methods for *o*-dichlorobenzene. The calculated exposure value is above the limit of detection (LOD) and limit of quantification (LOQ) using at least one of the monitoring methods identified (*e.g.,* NIOSH 1003, NIOSH Method 2549).

OSHA has set a permissible exposure limit (PEL) as a ceiling limit for *o*-dichlorobenzene of 50 ppm (29 CFR 1910.1000, Table Z-1; see also https://www.osha.gov/annotated-pels; accessed August 5, 2026). The PEL for *o*-dichlorobenzene was established in 1971 based on the American Conference of Governmental Industrial Hygienist's (ACGIH) 1968 to 1970 list of Threshold Limit Values (TLVs). *See* 36 FR 10466, 10503-04 (May 29, 1971); 79 FR 613834, 61388 (October 10, 2014). The PEL has not been updated since that time. Any update to OSHA's PEL must undergo both risk assessment and feasibility assessment analyses before selecting a level that will substantially reduce risk under the Occupational Safety and Health Act. EPA's calculated exposure value is a lower value than the OSHA PEL and is based on newer information and analysis from this risk evaluation.

Other governmental agencies and independent groups have also set recommended exposure limits established for *o*-dichlorobenzene. The American Conference of Governmental Industrial Hygienists (ACGIH) in 1996 set a Threshold Limit Value (TLV) at 25 ppm TWA and a STEL of 50 ppm. This chemical also has a 1990 NIOSH Recommended Exposure Limit (REL) ceiling limit of 50 ppm and immediately dangerous to life or health (IDLH) value of 1,000 ppm. State and international occupational exposure limits are summarized below for comparison.

Table_Apx F-1. Summary of Occupational Exposure Limits for *o*-Dichlorobenzene Compared to Proposed OEV/STEV

Organization/ State/Country/ Region	Limit Value (8-hour TWA)		Short-Term/ Ceiling (15-minute)		Reference [a] and Notes
	ppm	mg/m^3	ppm	mg/m^3	
U.S. EPA [Proposed Non-Regulatory Values]	0.022	0.13	0.14	0.84	Values derived in this draft risk evaluation (not considered regulatory limits).
California	25	150	50	300	(Cal Code Regs. Title 8, § 5155): 50 ppm is a ceiling value. Year not specified, but limits match ACGIH.
Hawaii	50	300	50	300	(Hawaii Administrative Rules Section 12-60-5): 50 ppm is both the PEL and ceiling value. Limits are as of 2011, but derivation year not specified. Values match the 1971 OSHA PEL.
Oregon	50	300	50	300	(Administrative Rules 437-002-0382): 50 ppm is both the PEL and ceiling value. Updating of standards in 1993 is discussed but derivation year not specified and values match the 1971 OSHA PEL.
Washington	–	–	50	300	(Admin. Code WAC 296-841-20025): Ceiling value only. Year not specified; value matches the 1971 OSHA PEL.
Canada	25	150	50	300	(Domestic Substances List): Year not specified, but limits are equivalent to the ACGIH TLV.
Europe	20	120	50	300	(ECHA Database): Established in 2000.
Australia	25	150	50	300	(o-Dichlorobenzene. Priority Existing Chemical No. 14. Full Public Report (2001)). Derivation year not specified, but limits are equivalent to the ACGIH TLV.
Japan	25	150	–	–	(National Institute of Technology and Evaluation [NITE] Chemical Risk Information Platform [CHIRP]): Year not provided.

[a] All websites/hyperlinks provided in this table accessed August 5, 2026.
"–" indicates that no value is available.

F.1 Draft Occupational Exposure Value Calculations

This section presents the calculations used to estimate the occupational exposure values using inputs derived in this draft risk evaluation. For *o*-dichlorobenzene, the occupational exposure value is based on respiratory toxicity following exposures of any frequency and the resulting 8-hour TWA is rounded to 0.022 ppm. The human health hazard value (HEC) used in the equation is derived in the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w).

Most Sensitive Occupational Exposure Value (Acute Non-Cancer)

The draft OEV (also EV_{acute}) is the concentration at which the acute MOE is equivalent to the benchmark of 30:

$$EV_{acute} = \frac{HEC_{acute}}{Benchmark\ MOE_{acute}} \times \frac{AT_{HEC\ acute}}{ED} \times \frac{IR_{resting}}{IR_{workers}} = \frac{0.45\ ppm}{30} \times \frac{\frac{24h}{d}}{\frac{8h}{d}} \times \frac{0.6125\ \frac{m^3}{hr}}{1.25\ \frac{m^3}{hr}} = 0.022\ \text{ppm}$$

$$\text{EV}_{\text{acute}}\left(\frac{\text{mg}}{\text{m}^3}\right) = \frac{EV\ ppm \times MW}{Molar\ Volume} = \frac{0.022\ \text{ppm} \times 147.0 \frac{g}{mol}}{24.45 \frac{L}{mol}} = 0.13 \frac{\text{mg}}{\text{m}^3}$$

Where:

Molar Volume = 24.45 L/mol, the volume of a mole of gas at 1 atm and 25 °C
MW = Molecular weight of *o*-dichlorobenzene (147.0 g/mole)

The hazard value (HEC of 0.45 ppm) is the same for occupational exposure scenarios (OESs) of all durations. The intermediate and chronic occupational exposure values can be calculated as the concentration at which the intermediate or chronic margin of exposure (MOE) would equal the benchmark MOE for average exposures over those durations. Toxicity does not accumulate from repeated exposures. Instead, respiratory toxicity and liver toxicity demonstrate the same or decreasing severity over time. In other words, the acute, single-day studies provide more sensitive or equally sensitive endpoints compared to repeat dosing studies in laboratory animals. As such, EPA has determined that evaluation of risks from a single-day (*i.e.*, acute) exposure is protective for intermediate and chronic exposures and only a single exposure value is presented. Therefore, the acute exposure value (EV_{acute}) is the draft OEV and applies to all durations for *o*-dichlorobenzene.

The parameters used in the above equations are described below. Numerical values chosen for the parameters are described in relevant sections of this draft risk evaluation and *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w).

Where:

$AT_{HECchronic}$ = Averaging time for the POD/HEC used for evaluating non-cancer, chronic occupational risk, based on study conditions and/or HEC adjustments (24 hours/day for 365 days/yr) and assuming the number of years matches the high-end working years (WY, 40 years) for a worker
Benchmark MOE_{acute} = Acute non-cancer benchmark margin of exposure, based on the total uncertainty factor of 30
EV_{acute} = Draft occupational exposure value based on respiratory toxicity
ED = Exposure duration (8 hours/day)
EF = Exposure frequency (1 day/yr for acute)

HEC_{acute} = Human equivalent concentration for acute occupational exposure scenarios

IR = Inhalation rate (default is 1.25 m^3/hour for workers and 0.6125 m^3/hour for the general population at rest)

Molar Volume = 24.45 L/mol, the volume of a mole of gas at 1 atm and 25 °C

MW = Molecular weight of *o*-dichlorobenzene (147.0 g/mole)

Unit conversion:

1 ppm = 6.0 mg/m^3 (based on the molecular weight of 147.0 g/mol for *o*-dichlorobenzene)

F.2 Summary of Air Sampling Analytical Methods Identified

EPA conducted a search to identify relevant NIOSH, OSHA, and EPA analytical methods used to monitor for the presence of *o*-dichlorobenzene in air (see Table_Apx F-2). This table presents validated methods from governmental agencies and is not intended to be a comprehensive list of available air monitoring methods for *o*-dichlorobenzene. The sources used for the search included the following (all hyperlinks accessed August 5, 2026):

1. NIOSH Manual of Analytical Methods (NMAM); 5th Edition
2. NIOSH NMAM 4th Edition
3. OSHA Index of Sampling and Analytical Methods
4. EPA Environmental Test Method and Monitoring Information

Table_Apx F-2. Limit of Detection (LOD) and Limit of Quantification (LOQ) Summary for Air Sampling Analytical Methods Identified

Air Sampling Analytical Methods	Year Published	LOD[a]	LOQ[a]	Notes	Source
NIOSH Method 1003[b]	2003 (Issue 3)	0.028–0.187 mg/m^3 (0.005–0.003 ppm)	0.27–2.7 mg/m^3 (4.5E−02 to 0.45 ppm)	Method reports the LOD as 0.8 µg per sample and provides procedures for collecting air samples between 1 and 10 L with a flow rate of 0.01 to 0.2 L/min.	NIOSH NMAM 4th Edition
NIOSH Method 2549	1996 (Issue 1)	0.017 to 0.1 mg/m^3 (0.002.8–0.01.7 ppm)	N/A	Method reports the LOD as 100 ng per sample and provides procedures for collecting air samples between 1 and 6 L with a flow rate of 0.01–0.05 L/min.	NIOSH NMAM 4th Edition
EPA Method 0602	1984	0.4 mg/m^3 (sample LOD; 0.066 ppm)	N/A	Method reports the LOD as 0.4 ug/L and provides procedures for analyzing gases bubbled through a 5 mL water sample with a flow rate of 30–35 mL/min.	EPA Environmental Test Method and Monitoring Information

LOD = limit of detection; LOQ = limit of quantification; ppm = parts per million
All hyperlinks were accessed August 5, 2026.
[a] These sources cover a range of LODs and LOQs both below and above the most sensitive occupational exposure value. This method provides the LOD based on sample size.
[b] This method was utilized in the inhalation monitoring procedure for the SABIC Test Order (2024) and the target LOD was successfully achieved in that dataset.

F.3 Short-Term Occupational Exposure Value Derivation

The basis of the HEC value underlying the draft OEV for *o*-dichlorobenzene is respiratory toxicity, with the HEC derived from a 5-day inhalation study (U.S. EPA, 2026aj; NIEHS, 2025a) and supported by co-critical PODs from a 5 to 14 day study and a 90-day study. EPA determined that this endpoint is applicable to all exposure durations, and severity appeared to decrease over time, so extrapolating to a 15-minute exposure is reasonable despite the uncertainty. The ten Berge equation for extrapolating to shorter durations (ten Berge et al., 1986) can be used with an exponent of 3.0 from (NRC, 2001) and (NIOSH, 2013). AEGL guidance (NRC, 2001) cautions against extrapolating from more than 4 hours of exposure down to less than 30 minutes; therefore, an extrapolation to the 30-minute value was applied. When applying the benchmark MOE of 30, a draft STEV of 0.14 ppm is derived.

Below are the calculations used to derive the potential short-term occupational exposure value, based on the transcriptional POD (tPOD) in lung from (U.S. EPA, 2026aj; NIEHS, 2025a). First, the lung tPOD of 6.67 ppm from 6 hours of inhalation exposure in mice was dosimetrically adjusted to humans using a regional gas dose ratio (RGDR) value of 0.27 (see Section 2.3.1.4 in the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w)). This resulted in a dosimetrically-adjusted POD of 1.80 ppm.

The next step in adjusting an acute POD for a shorter duration is to derive the ten Berge constant (*k*) based on the dosimetrically-adjusted POD and original exposure duration from the study along with the ten Berge exponent (*n*) for *p*-dichlorobenzene, as follows.

$$C^n \times t = k$$

$$1.80^3 \times 6 = k$$

$$k = 34.99$$

Where:

C	=	Air concentration / study POD at duration *t* in ppm (1.80 ppm in (Monsanto Chemical Company, 1994))
n	=	ten Berge exponent (default value of 3 (NIOSH, 2013; NRC, 2001))
t	=	Timepoint of the measured concentration, in hours (6 hours in (NIEHS, 2025a))
k	=	Calculated ten Berge constant

The new HEC is then calculated using the same equation, where *k* and *n* remain constant.

$$C^n \times t = k$$

$$C^3 \times 0.5 = 34.99$$

$$C = \left(\frac{34.99}{0.5}\right)^{0.33}$$

$$C_{STEV} = 4.12 \text{ ppm}$$

Where:

C_{STEV}	=	HEC at short-term exposure value duration *t* in ppm
T	=	Relevant exposure duration for a short-term exposure value (30 minutes, or 0.5 hours, to avoid over-extrapolation to 15-minutes)

Finally, the short-term exposure value is calculated from the C_{STEV} by applying the benchmark MOE used for non-cancer acute risk estimates and the EV_{acute} derivation.

$$STEV = C_{STEV} \div \text{benchmark MOE}$$

$$STEV = 4.12 \div 30 = 0.14 \text{ ppm}$$

Where:

STEV	=	Short-term exposure value
Benchmark MOE	=	Acute non-cancer benchmark MOE, based on the uncertainty factor of 3

Appendix G SUMMARY OF *o*-DICHLOROBENZENE TEST ORDERS

The Frank R. Lautenberg Chemical Safety for the 21st Century Act revised TSCA section 4 to add authority to issue test orders. TSCA section 4(a)(2)(A)(i) allows the EPA to impose testing requirements via "rule, order, or consent agreement" whenever new information "is necessary" in order to perform a risk evaluation (15 U.S.C. 2603(a)(2)(A)(i)). Under this authority EPA issued test orders for information on environmental hazard, inhalation exposures to workers, and consumer exposure for *o*-dichlorobenzene in January 2021 and August 2022 (see List of Chemicals Subject to Test Orders; accessed August 5, 2026).

Five chemical data submissions from test rules were received (Table_Apx G-1) for *o*-dichlorobenzene including: two facility specific occupational exposure studies (NIOSH Method 1003); one consumer exposure study (on ceramic glaze); and two environmental hazard studies (OECD 233 and OCSPP 850.1735 Sediment Invertebrate). Two test orders for consumer exposure were extinguished.

Details regarding the data submissions are described in the *Draft Human Health and Environmental Hazard Assessment for o-Dichlorobenzene* (U.S. EPA, 2026w) and the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f).

Table_Apx G-1 Summary of *o*-Dichlorobenzene Data Submissions from Test Orders

Discipline	Test Sponsor	Test Protocol	Final Study Report	EPA Review Memo	Reference
Occupational Exposure	Weylchem	NIOSH 1003/1013 Inhalation - Weylchem	August 13, 2025	January 31, 2026	(WeylChem, 2025)
Occupational Exposure	SABIC	NIOSH 1003/1013 Inhalation - SABIC	May 30, 2024	January 15, 2026	(SABIC, 2024)
Consumer Exposure	ACC	Consumer protocol 3 (on ceramic glaze)	September 30, 2024	December 18, 2025	(Integral Consulting, 2024)
Environmental Hazard	ACC	OECD 233 Life-Cycle Sediment Invertebrate	April 13, 2025	September 30, 2025	(Eurofins EAG Agroscience LLC, 2025)
Environmental Hazard	ACC	OCSPP 850.1735 10d Sediment Invertebrate	June 28, 2024	July 24, 2025	(Eurofins EAG Agroscience LLC, 2024)
Consumer Exposure	ACC	EPA protocol 3 (on degreaser)	*Extinguished 5/20/24*		
Consumer Exposure	ACC	EPA protocol 2 (on drain opener)	*Extinguished 9/14/23*		

Appendix H SENSITIVITY ANALYSIS FOR INHALATION EXPOSURE FOR THE OES OF USE OF INK, TONER, AND COLORANT PRODUCTS

In cases when an inhalation monitoring dataset has a high proportion of non-detects, the handling of those non-detects may have an impact on the resulting central tendency and high-end exposure calculations.

Typically, for datasets that have some detected samples but also include exposure data that were reported as below the limit of detection (LOD), EPA estimated the exposure concentrations for these data following EPA's *Guidelines for Statistical Analysis of Occupational Exposure Data* (U.S. EPA, 1994), which recommends using the $\frac{LOD}{\sqrt{2}}$ if the geometric standard deviation of the data is less than 3.0 and $\frac{LOD}{2}$ if the geometric standard deviation is 3.0 or greater. If there is only one detected sample, EPA used $\frac{LOD}{\sqrt{2}}$ for non-detects. See Section 8.1.3 (for general methodology) and Section 8.2 (for OES-specific methodology) of the *Draft Chemistry, Fate, Release, and Exposure Assessment for o-Dichlorobenzene* (U.S. EPA, 2026f). This original method is referred to for the remainder of this section as the "current assumption."

In the case of Use in Inks, Toners, and Colorants, the high-end and central tendency worker inhalation exposure estimates for these OES are based on occupational inhalation data for *o*-dichlorobenzene during use of ink, toner, and colorant products in OSHA's CEHD database (OSHA, 2019). This dataset had 23 partial-shift PBZ samples (22 non-detect [ND]) that equated to 4 full-shift TWA samples. Samples were taken in May 1992 from one site. Using the current assumption, EPA used a substitution method to quantify the 22 non-detects, substituting each non-detect value with its LOD divided by the square route of two. In absence of data specific to ONU exposure, EPA assumed that worker central tendency exposure was representative of ONU exposures.

Because the calculated MOE using the current assumption method was below the benchmark MOE of 30, EPA conducted two additional exposure estimates for this OES to examine the impacts of the current assumption for non-detect samples. The first additional estimate ("lower bound") assumes that the non-detect samples are zero, and the second estimate ("upper bound") assumes the non-detect samples are at the LOD. These estimates together allow for a better understanding of the range of possible exposures, as well as the impacts on the exposure estimates and risk results of the current assumption for the non-detects samples.

Table_Apx H-1 provides a summary of this analysis. For this dataset, the central tendency and high-end are calculated using the median and 95th percentile respectively (see Section 4.1.1.1).

As can be seen, regardless of the assumptions used for the non-detect samples, the resulting calculated MOEs in all cases do not change their position relative to the benchmark MOE of 30. This analysis increases confidence in the assessment findings for this OES.

Table_Apx H-1. Sensitivity Analysis for the Use of Ink, Toner, and Colorant Products OES

Population	"Lower Bound" Exposure (Non-Detects Assumed to be 0)		"Current Assumption" Exposure (Non-Detects Assumed to be LOD/√2)		"Upper Bound" Exposure (Non-Detects Assumed to be at the LOD)	
	CT[a]	HE[a]	CT	HE	CT	HE
Workers	0 [b]	3.0E−02 (MOE = 22)	8.3E−03 (MOE = 80)	3.7E−02 (MOE = 18)	1.7E−02 (MOE = 40)	4.4E−02 (MOE = 15)
ONUs	0 [b]	0 [b]	8.3E−03 (MOE = 80)	8.3E−03 (MOE = 80)	1.7E−02 (MOE = 40)	1.7E−02 (MOE = 40)

LOD = limit of detection; OES = occupational exposure scenario; MOE = margin of exposure; ONU = occupational non-user; SEG = similar exposure group

[a] Central tendency (CT) and high-end (HE) are calculated using the 50th and 95th percentile of the dataset respectively.

[b] Note that, since the CT is calculated using the 50th percentile of the set of numbers (the median, or middle number), setting 22 of 23 samples to 0 will result in a 50th percentile of 0. Because the single detected sample remains in the dataset, the 95th percentile remains heavily influenced by this sample.