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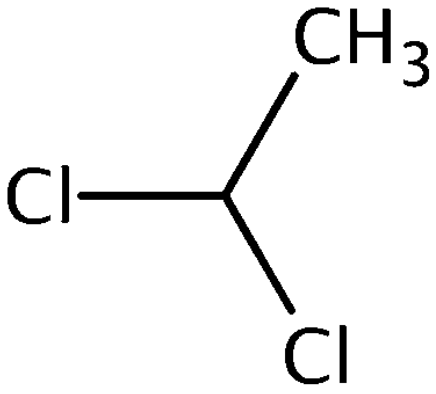
Office of Chemical Safety and
Pollution Prevention

Summary of and Response to External Peer Review and Public Comments on the Risk Evaluation for 1,1-Dichloroethane and Human Health Hazard Technical Support Document for 1,2-Dichloroethane

EPA-HQ-OPPT-2018-0426 and EPA-HQ-OPPT-2024-0114

Comment Summary and Responses



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Key Acronyms and Abbreviations

ADAF	age-dependent adjustment factors
ADME	absorption, distribution, metabolism, and elimination
AIHA	American Industrial Hygiene Association
AIM	Analog Identification Methodology tool
ALDH2	aldehyde dehydrogenase 2
AMTIC	Ambient Monitoring Technology Information Center
ANOVA	analysis of variance
ATSDR	Agency for Toxic Substances and Disease Registry
BMC	benchmark
BMCL	benchmark concentration limit
BMD	benchmark dose
BMDL	benchmark dose lower confidence limit
BMR	benchmark response
CWA	Clean Water Act
DEVL	Dermal Exposure to Volatile Liquids
DIDP	di-isodecyl phthalate
EC	effective concentration
ECETOC	European Centre for Ecotoxicology and Toxicology of Chemicals
ECHA	European Chemicals Agency
ECRAD	Existing Chemicals Risk Assessment Division
EPA	U.S. Environmental Protection Agency
EU	European Union
HED	Health Effects Division
IPCS	International Programme on Chemical Safety
IRIS	Integrated Risk Information System
IUR	Inhalation Unit Risk
LDEQ	Louisiana Department of Environmental Quality
LOAEL	lowest-observed-adverse-effect level
MOA	mode of action
MOE	margin of exposure
NASEM	National Academies of Sciences, Engineering, and Medicine
NCI	National Cancer Institute
NEI	National Emissions Inventory
NOAEL	no-observed-adverse-effect level
NTP	National Toxicology Program
OECD	Organisation for Economic Co-operation and Development
OEV	occupational exposure value
OPPT	Office of Pollution Prevention and Toxics
ORD	Office of Research and Development
PBPK	physiologically based pharmacokinetic
PECO	population, exposure, comparator, and outcome
PESS	potentially exposed or susceptible subpopulations
POD	point of departure
PPE	personal protective equipment
QSAR	Quantitative Structure-Activity Relationship model
RMP	Risk Management Plan
SACC	Science Advisory Committee on Chemicals

SEG	Similar Exposure Group
SHEDS	Stochastic Human Exposure and Dose Simulation
SIDS	Screening Information Dataset
TRA	Targeted Risk Assessment
TRI	Toxics Release Inventory
TRV	toxicity reference value
TSCA	Toxic Substances Control Act
TWA	time-weighted average
UCMR3	third Unregulated Contaminant Monitoring Rule
U.S.	United States
VI	Vinyl Institute
Web-ICE	Web-based Interspecies Correlation Estimation application
WHO	World Health Organization

Introduction

On July 2, 2024, the U.S. Environmental Protection Agency (EPA or the Agency) published the *2024 Draft Risk Evaluation for 1,1-Dichloroethane* and the draft *Human Health Hazard Technical Support Document for 1,2- Dichloroethane* and accepted public comment until September 3, 2024. Materials on the draft risk evaluation are available at www.regulations.gov in docket EPA-HQ-OPPT-2024-0114. A preparatory virtual public meeting was held on August 27, 2024, for reviewers and the public to comment on and ask questions regarding the scope and clarity of the draft charge question for the Science Advisory Committee on Chemicals (SACC) peer review public meeting held from September 17 to 20, 2024.

This document summarizes the public and external peer review comments that the EPA's Office of Pollution Prevention and Toxics (OPPT) received for the draft risk evaluation of 1,1-dichloroethane and the draft human health hazard assessment of 1,2-dichloroethane. It also provides EPA/OPPT's response to the comments received from the public and the peer review. EPA/OPPT appreciates the valuable input provided by the public and peer review. The input resulted in revisions to the risk evaluation document. Where appropriate, the peer review and public comments are categorized by the peer review charge questions.

This document references sections and other elements of the final Risk Evaluation for 1,1-Dichloroethane; CASRN 75-34-3, EPA 740-R-25-013, June 2025 (hereafter referenced to as "the Risk Evaluation."

Additionally, within each theme comments that cover similar issues are presented together.

1. Overarching comments
2. Chemistry, fate, and transport of 1,1-dichloroethane
3. Releases and concentrations of 1,1-dichloroethane in the environment
4. Environmental risk assessment
5. Human health risk assessment
6. Unreasonable risk determination
7. Systematic review
8. Formatting and editing
9. Other comments on the draft risk evaluation
10. Comments not relevant to the draft risk evaluation

Table 1: Index of Comment Submissions Sorted by Submission Number

Submission Number	Commenter Name
EPA-HQ-OPPT-2024-0114-0052	American Chemistry Council
EPA-HQ-OPPT-2024-0114-0053	Vinyl Institute
EPA-HQ-OPPT-2024-0114-0059	Stantec Consulting Services, Inc. on behalf of Vinyl Institute
EPA-HQ-OPPT-2024-0114-0060	Anonymous (withdrawn)
EPA-HQ-OPPT-2024-0114-0061	Nuclear Energy Institute
EPA-HQ-OPPT-2024-0114-0062	Environmental Defense Fund
EPA-HQ-OPPT-2024-0114-0063	American Chemistry Council
EPA-HQ-OPPT-2024-0114-0064	National Tribal Toxics Council
EPA-HQ-OPPT-2024-0114-0065	People for the Ethical Treatment of Animals (PETA)
EPA-HQ-OPPT-2024-0114-0066	Vinyl Institute
EPA-HQ-OPPT-2024-0114-0067	Vinyl Institute
EPA-HQ-OPPT-2024-0114-0068	University of California, San Francisco Program on Reproductive Health and the Environment
EPA-HQ-OPPT-2024-0114-0069	Louisiana Environmental Action Network et al. (Part 1 of 3)
EPA-HQ-OPPT-2024-0114-0070	Louisiana Environmental Action Network et al. (Part 2 of 3)
EPA-HQ-OPPT-2024-0114-0071	Louisiana Environmental Action Network et al. (Part 3 of 3)
EPA-HQ-OPPT-2024-0114-0078	Stantec Consulting Services, Inc. on behalf of Vinyl Institute

Section 1 – Overarching Comments

Comments associated with this issue are summarized in the subsections below.

Section 1.1 – Scope of the Draft Risk Evaluation

Comment 1.1.1

Summary: A public commenter (0068) said that EPA failed to identify and account for all relevant potentially exposed or susceptible subpopulations (PESS) and accurately characterize their risks, as required by the Toxic Substances Control Act (TSCA). The commenter said that EPA has not applied a transparent methodology for identifying PESS across its various risk evaluations and suggested that EPA develop and apply a consistent methodology. The commenter suggested that EPA should focus on identifying PESS based on either chemical-specific evidence or the broader literature on susceptibility factors, and then consider how to adequately account for the elevated risks for each group. Finally, the commenter described various susceptibility factors that EPA should consider, including pre-existing disease, socio-demographic factors, and nutrition, among others.

EPA Response: TSCA requires that the determination of whether a chemical substance presents an unreasonable risk includes consideration of unreasonable risk to "a potentially exposed or susceptible subpopulation (PESS) identified as relevant to the risk evaluation" by EPA, TSCA section 6(b)(4)(A). TSCA section 3(12) states that "the term 'potentially exposed or susceptible subpopulation' 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." For each chemical undergoing a risk evaluation, EPA evaluates the potential for unreasonable risks to PESS under specific conditions of use relevant for general populations, consumer exposures and subsets of occupational exposures/workers.

EPA considers PESS on a chemical specific basis. Specifically for the 1,1-dichloroethane draft and final risk evaluations, EPA identified the following PESS groups: infants exposed to drinking water during formula bottle feeding, subsistence and Tribal fishers, individuals with pre-existing conditions such as chronic kidney disease, workers, people with the aldehyde dehydrogenase-2 polymorphism, lifestyle factors such as smoking cigarettes or exposure to secondhand smoke, and communities that are located near facilities that emit 1,1-dichloroethane (Section 5.3.2, Table 5-49).

Comment 1.1.2

Summary: A public commenter (0064) expressed support for EPA taking steps to correctly identify subsistence fisherman populations who consume fish as a PESS.

EPA Response: The final risk evaluation identifies subsistence fishers as a PESS in Section 5.3.2 and assesses risks via fish ingestion in Section 5.1.2.4.2.

Comment 1.1.3

Summary: The SACC asked EPA to provide an explanation for the environmental exposure pathways in Figure 1-6, "Populations Assessed in this Draft Risk Evaluation for 1,1-dichloroethane" at Line 1307.

EPA Response: Environmental exposure pathways are discussed in Sections 3.2, 3.3, and 4.1 of the risk evaluation.

Section 1.2 – Peer Review and Public Comment Process

General Comments

Comment 1.2.1

Summary: A public commenter, in multiple submissions to the docket (0052, 0063), supported EPA's decision to change the proposed letter peer review to the revised peer review format.

EPA Response: EPA's decisions on the peer review under TSCA are based on the science needs of individual products and issues, consistent with EPA and OMB guidance on peer review.

Charge Questions

Comment 1.2.2

Summary: A public commenter, in docket submissions 0053 and 0066, said that the charge questions to the TSCA Science Advisory Committee on Chemicals (SACC) demonstrate EPA's commitment to developing a robust risk evaluation for 1,1-dichloroethane and a robust human health hazard assessment for 1,2-dichloroethane. The commenter added that the charge questions highlight important limitations on methodologies that EPA implemented in these evaluations. Commenter 0053 also provided comments on the structure and completeness of the charge questions, as well as key information or topics that the commenter urged the SACC to consider during their review. The commenter was joined by another public commenter (0059) in asking EPA to add a final question for the SACC to review the proposed occupational exposure values (OEVs) in Appendix N of the draft risk evaluation and specifically to comment on the appropriateness of the calculations and the selection of uncertainty factors.

EPA Response: EPA did not update the charge questions a result of the comments from Commenter 0053 and Commenter 0059, as EPA felt that the charge questions were sufficiently broad for the SACC to consider the issues raised by the commenters.

SACC Input

Comment 1.2.3

Summary: A public commenter, in docket submissions 0052 and 0063, wrote that it is beyond the scope of the SACC for EPA to address differing scientific opinions by seeking SACC input on EPA science policy questions related to risk assessment practices and use of existing guidance documents. The commenter said that these were not developed under the auspices of the SACC, and they could have implications that extend beyond TSCA risk evaluations. Another public commenter (0065) said that EPA's solicitation of input from the SACC on differences in scientific opinions is a welcome step that helps foster a transparent and constructive comment period and peer review.

EPA Response: The purpose of the SACC is to provide independent scientific advice and recommendations to EPA on the scientific and technical aspects of risk assessments, methodologies, and approaches for chemicals regulated by TSCA. The charge questions issued to the SACC for 1,1-dichloroethane focused on technical aspects of and methodologies used in the risk evaluations and are therefore in the purview of the peer review process.

1,2-Dichloroethane

Comment 1.2.4

Summary: A public commenter (0066) said that EPA should provide an additional opportunity for public comment and peer review after revising its analog analysis in response to the SACC's input on the analogs as requested in their charge questions. In another submission to the docket (0067), the commenter said that EPA's plan for the 1,2-dichloroethane human health hazard assessment did not undergo peer review with the full 1,2-dichloroethane risk evaluation because of the current SACC peer review using 1,2-dichloroethane as an analog for 1,1-dichloroethane for human health effects. The commenter said that the hazard assessment will drive certain determinations in the risk evaluation and should be reviewed concurrently with it, the SACC must review any changes to the hazard assessment reflected in the draft risk evaluation, and it would be arbitrary and capricious not to provide an opportunity for public comment on the draft risk evaluation as a whole.

EPA Response: EPA provided public notice and a 60-day public comment period on the draft 1,1-dichloroethane risk evaluation and the draft 1,2-dichloroethane human health hazard assessment, consistent with TSCA section 6(b)(4)(H) and 40 CFR 702.43(c). These documents also underwent peer review consistent with 40 CFR 702.41. While EPA may, in appropriate cases involving significant changes between draft and final risk evaluations, seek additional public comment or peer review of those changes prior to finalizing a risk evaluation, EPA disagrees with the commenter that additional public comment or peer review are needed for the 1,1-dichloroethane risk evaluation. The changes between draft and final were not so significant or unforeseeable as to warrant additional public comment or peer review.

Other Suggestions

Comment 1.2.5

Summary: A public commenter (0066) suggested that EPA post the human health and environmental modeling input files alongside the draft TSCA risk evaluations so that they are available for public comment.

EPA Response: In draft and final risk evaluation, EPA does provide supplemental files for both risk calculators and other files that provide modeling input values See docket EPA-HQ-OPPT-2024-0114 for a list of all supplemental files.

Section 1.3 – Legal and Regulatory Issues

No comments were identified that provided overarching legal or regulatory issues. Where commenters raised legal issues on specific aspects of the risk evaluation, EPA has summarized that content within the bin for that specific aspect of the risk evaluation. For example, see Section 5.1 – Human Exposures for legal issues raised on aggregate exposures and cumulative risk.

Section 2 – Chemistry, Fate, and Transport of 1,1-Dichloroethane

Comments associated with this issue are summarized in the subsections below.

Section 2.2 – Environmental Fate and Transport Assessment

Comment 2.2.1

Summary: A public commenter (0066) suggested that EPA implement several changes to the fate and transport modeling for surface waters. First, the commenter said that the EPA approach of selecting the 7Q10 is sufficiently health protective of aquatic organisms, with biodegradation and evaporation providing additional attenuation mechanisms. The commenter recommended that EPA use quantitative metrics such as the harmonic mean or 7Q10 in favor of qualitative terms when discussing the magnitude of exposure potential. Second, the commenter said that the environmental scenarios with annual releases compressed into 15, 21, or 35 days is not supported in the literature and results in a "beyond worst case" assessment that is more appropriate for screening than refined assessment. The commenter recommended that the surface water environmental assessment of manufacturing conditions be revised to allocate releases over 350 operational days, rather than 21. Finally, the commenter said that the draft assessment lacks an uncertainty analysis and recommended that EPA add a comprehensive discussion of uncertainty.

EPA Response: Although biodegradation is not accounted for as an input for generating modeled aqueous exposure concentrations for 1,1-dichloroethane, hydrolysis and volatility properties, such as Henry's Law constant and vapor pressure, are included as inputs for the Point Source Calculator model when generating modeled aqueous exposure concentrations for 1,1-dichloroethane.

Harmonic mean and 7Q10 are flow metrics that EPA used in estimating 1,1-dichloroethane surface water concentrations for differing scenarios include: 7Q10, which is the lowest 7-day average flow occurring in a 10-year period and represents a low flow scenario is used for aquatic assessments and acute human exposure estimates whereas the harmonic mean is used for chronic human exposure estimates.

The environmental risk assessment in the draft risk evaluation for 1,1-dichloroethane included both the hazard-based release durations and facility operating days release durations, which as the commenter noted was 350 total facility operating days for the Manufacturing Condition of Use (COU). Bounding the exposure concentrations based on hazard-based durations and facility operating days was done in lieu of not having the exact release pattern over a 365-day period for most the facilities releasing 1,1-dichloroethane. Additionally, for one manufacturing facility reporting discharge monitoring report (DMR) data, some of the reported permitted releases of 1,1-dichloroethane to surface waters occurred during extreme weather events and in an even shorter duration than the hazard-based durations used in the 1,1-dichloroethane draft risk evaluation (Section 3.1.1.2.3), which supports risk characterization of release durations shorter than total facility operating days. An additional storm release scenario is presented in Section 3.3.3.2.3 of the Risk Evaluation. The modeled surface water concentrations of 1,1-dichloroethane based on the number of operating days per year are presented in the environmental risk characterization in Tables 4-12, 4-13, and 4-14 of the Risk Evaluation.

Uncertainties in the analyses used for risk characterization were described in the Draft Risk Evaluation for 1,1-Dichloroethane in the weight of the scientific evidence for environment releases (Section 3.2.2), concentrations of 1,1-dichloroethane in the environment (Section 3.3.5), environmental exposures (Section 4.1), and environmental hazards (Section 4.2).

Comment 2.2.2

Summary: The SACC supported the inclusion of The Key Points Table in Section 2.2 of the Environmental Fate and Transport Assessment on Page 42. The SACC asked EPA to address a perceived contradiction in the last point about persistence and bioaccumulation because of its importance "when assessing potential hazard and risk to humans and organisms, including wildlife." The SACC requested EPA elaborate on a comment about half-life by providing information about secondary products. The SACC similarly requested EPA elaborate on a mention of anaerobic biodegradation by providing information about its product. The SACC also requested information about the bioactivity of these products in the case that the "bioconcentration/bioaccumulation factor does not include bioactive products."

The SACC asked EPA if the products of photolysis are identified, despite the note in Line 1619, that 1,1-dichloroethane will not undergo direct photolysis (Appendix D.2.2).

EPA Response: The final point in the Key Points Table in Section 2.2 has been revised to say, "1,1-Dichloroethane meets criteria for persistence but not criteria to be classified as bioaccumulative based on estimated bioconcentration factor (BCF)/bioaccumulation factor (BAF) values of less than 1,000." As stated in Appendix C.2.4.1 and C.2.4.2 of the Risk Evaluation, under anaerobic conditions 1,1-dichloroethane is expected to undergo reductive dechlorination, which results in the formation of chloroethane and ethane. EPA has determined that these anaerobic biodegradation byproducts are likely to be less bioactive than the parent compound and is not assessing them in this risk evaluation.

EPA did not identify any degradation products due to indirect photolysis during its systematic review process.

Section 3 – Releases and Concentrations of 1,1-Dichloroethane in the Environment

Comments associated with this issue are summarized in the subsections below.

Section 3.1 – Environmental Releases

Comment 3.1.1

Summary: Two public commenters (0069, 0062) stated that EPA unlawfully excluded releases associated with extreme weather events, facility malfunctions, and other reasonably foreseen but unintended chemical incidents. One of the commenters (0069) said that EPA did not review State and Federal databases of chemical incidents and added that 1,1-dichloroethane and 1,2-dichloroethane are particularly prone to such incidents because they are overwhelmingly manufactured, used, and released in a region that commonly experiences hurricanes and other extreme weather events.

EPA Response: In the Risk Evaluation EPA included a storm scenario in Section 3.3.3.2.3 of the Risk Evaluation to describe impacts of releases during storm events at a facility in Louisiana. This scenario was included in the Risk Evaluation based on SACC recommendation. EPA is including a storm scenario for this specific facility because there are available release data showing releases of 1,1-dichloroethane across multiple storm events over the release years assessed. The storm scenario described in the Risk Evaluation is specific to this facility and is not a generic scenario that applies to other storm releases at other facilities. EPA used USGS, TRI, NEI, and DMR databases to develop its release assessment.

Additionally, in response to the comments asking for malfunctions to be considered, EPA used TRI reported air emission data to estimate ambient air concentrations from TSCA COUs. TRI emission data include releases from start up, shutdown, and malfunction events, since the TRI release definition broadly covers any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any toxic chemical (40 CFR 372.3). Specifically, in Part II, Section 8.8, an owner/operator must report the quantity of any release of a toxic chemical into the environment or transferred off-site as a result of a remedial action, catastrophic event, or one-time event not associated with production processes.

Comment 3.1.2

Summary: A public commenter (0064) stated that EPA should include air emissions modeling of landfills in the risk evaluation, including releases from unlined and unmanaged landfills such as the ones found in Alaska Native villages. The commenter added that it would be useful to understand how many of the 672 disposal sites reporting 1,1-dichloroethane in air emissions actually accept 1,1-dichloroethane waste to support the identification of fenceline communities proximate to landfills.

EPA Response: EPA used reported releases from NEI and TRI to model ambient air concentrations of 1,1-dichloroethane. During the data review process EPA identified reported emissions from 672 disposal facilities, most of which were municipal non-hazardous landfills. EPA investigated potential sources of 1,1-dichloroethane in non-hazardous landfills but EPA could not identify any COUs that are likely to result in disposal of 1,1-dichloroethane to unlined, unmanaged landfills. EPA determined that air emissions of 1,1-dichloroethane from non-hazardous landfills are likely due to biodegradation of other chlorinated solvents and are outside the scope of this risk evaluation.

Section 3.2 – Concentrations of 1,1-Dichloroethane in the Environment

Comment 3.2.1

Summary: A public commenter (0062) cited statistics on the quantities of chemical emissions from start up, shutdown, and malfunction events to indicate that they are a large portion of chemical emissions, generally. They also state, that when they compared this data to TRI data, the data are inconsistent, and they assert that these emissions may be more significant contributor to total emissions than indicated by the stack and fugitive emissions reported to the Toxics Release Inventory (TRI).

EPA Response: EPA used TRI reported air emission data to estimate ambient air concentrations from TSCA COUs. TRI emission data include releases from start up, shutdown, and malfunction (SSM) events, since the TRI release definition broadly covers any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any toxic chemical (40 CFR 372.3). Depending on the specific circumstances, SSMs may be reported a one-time release rather than as part of the annual emissions. A one-time release is described in Part II, Section 8.8, as any release of a toxic chemical into the environment or transferred off-site as a result of a remedial action, catastrophic event, or one-time event not associated with production processes.

The commenter provided data on releases that occur from SSM events. The commenter provided references to other documents that compare SSM releases as reported in the Texas Commission on Environmental Quality's State of Texas Environmental Electronic Reporting Systems (STEERS) to one time releases report to TRI. The one-time release data referenced by the commenter refers to TRI Section 8.8 releases that are due to remedial actions, catastrophic events or one-time events not associated with the production process. The reporting requirements for SSMs in STEERS are not the same as those for one-time releases in TRI. In Texas, maintenance, startup and shutdown activities are regulated under 30 TAC (Texas Administrative Code) Chapter 101, which describes the reporting requirements for air emission and maintenance events. The types of emissions that are reported as air emission and maintenance events "emissions events"; "scheduled maintenance, startup, and shutdown activities"; and "excess opacity events." 30 TAC Chapter 101 provides specific definitions for each of these emission types. Overall, the three definitions describe a broader definition of release than the TRI one-time releases. For instance, a release occuring as a part of a scheduled maintenance, startup, and shutdown activities would generally be considered to be part of the production process and therefore would be reported to TRI as part of the facility's annual release and not as a one-time release. This would result in higher emissions reported to STEERS as SSMs compared to one-time releases reported to TRI. Therefore, the observed differences in the datasets described by the commenter are potentially due to differences in reporting requirements between federal and state-specific regulations.

Storm-Related Release Data

Comment 3.2.2

Summary: A public commenter (0053) addressed charge question 1 and agreed with the appropriateness of the assumptions made in the 1,1-dichloroethane environmental exposure assessment that the SACC reviewed. Specifically, the commenter said:

- The exclusion of the highest release data is appropriate and more representative of release patterns;

- The influence of climate change on release patterns should account for climate adaptation and should be assessed using data collected over a longer period;
- Data used in modeling should be as representative as possible of actual conditions rather than an estimation of uncertain conditions; and
- EPA's approach to refined modeling should simulate realistic release scenarios.

EPA Response: For the Lake Charles facility, EPA collected and reviewed facility release data from 2015 to 2021 to determine release patterns. For this facility specifically, EPA is presenting two surface water exposure scenarios: one that is representative of storm events and includes the highest release data, and one that is representative of normal operating conditions. For both exposure scenarios, EPA used the NHDPlus database to estimate receiving water flows and resulting environmental exposures.

Comment 3.2.3

Summary: Some members of the SACC agreed with EPA's exclusion of the highest release event to surface water as not representative of usual operating conditions when evaluating general population exposure. Those members of the SACC recognized that EPA excluded only the highest annual release from 2020 when considering the releases from 2015 to 2020 and, to assess the most conservative scenario, assumed the entire annual release occurred in a single day. Those members of the SACC found that "the conservative approach is appropriate given that it represents the reasonable worst case under the constraint of data availability" and felt that the exclusion of the 2020 Lake Charles release was appropriate.

Some members of the SACC noted that releases of 1,1-dichloroethane due to natural disasters, like storms and floods, and accidents should be evaluated separately to prevent misrepresentation of general population risks.

Other members of the SACC disagreed and suggested storm-related releases and other unplanned events should be included for general population exposure because of the "increasing regularity of storm events due to climate change, possible disproportionate impacts to vulnerable communities, and inadequate use of data on unplanned chemical releases."

The SACC noted that the exclusion of storm-related releases disproportionately affects fenceline communities, which are often composed of low-income and minority populations living near hazardous facilities. The SACC also noted that, according to Coming Clean (2021-2023 Report), chemical incidents are more likely to impact Black and Latino communities, and, according to the Louisiana Environmental Action Network, chemical facilities in these communities experience more frequent disasters than those in white communities. The SACC also noted that these communities face heightened risks during recurring storms and hurricanes because they often lack critical infrastructure and emergency resources to respond to chemical releases during extreme weather, compounding their disproportionate exposure to toxic chemicals.

The SACC noted that climate change is increasing the frequency and severity of natural hazards, especially in regions where hazardous chemical facilities are concentrated (NOAA NCEI, 2024). The SACC provided EPA with additional scientific support for including climate change in this risk assessment from Santella (2023) and the U.S. Government Accountability Office's report on EPA's Risk Management Plan (RMP) (2022), given the likelihood of hurricanes, floods, and storm surges to impact RMP facilities and that these phenomena are increasingly representative of the operating environment in areas prone to extreme weather. The SACC noted that the exclusion of the Lake Charles release data may significantly underestimate the risk posed by this chemical as conditions similar to that

event become more common and should be included under EPA's conception of reasonably foreseeable releases.

The SACC concluded that "EPA has also failed to account for other unplanned releases from facilities like the one in Lake Charles, which regularly experiences equipment malfunctions, power outages, and shutdown conditions." The SACC suggested that "EPA underestimates the frequency and severity of unplanned chemical releases" by not including data points for unplanned releases such as those from sources like the Louisiana Department of Environmental Quality (LDEQ) and thereby "leaves a significant gap in the risk evaluation" that diminishes EPA's ability to accurately assess the risks posed by 1,1-dichloroethane and propose appropriate risk management measures.

The SACC recommended that EPA should "include storm-related releases and other unplanned events in the risk evaluation of 1,1-dichloroethane, given that these events are foreseeable and recurring;" "consider the disproportionate impacts on fence-line communities, who are more vulnerable to chemicals released during extreme weather events;" and "review federal and state data on unplanned chemical releases, including those reported by LDEQ, to ensure that all relevant risks are captured in the evaluation."

The SACC also suggested "integrating certain principles from the Clean Water Act's (CWA) risk determination framework" to ensure a more comprehensive and protective assessment of chemical risks, especially in light of increasing climate-related hazards. The SACC specifically recommended principles such as "CWA's approach to assessing potential harm from waste discharges, by considering frequency of past discharges, proximity to navigable waters, age of equipment, hazards like flooding and storms, and facility-specific information that could inform TSCA's evaluation of conditions of use" and "ensure a more comprehensive and protective assessment of chemical risks, especially in light of increasing climate-related hazards." The SACC suggested these changes could help EPA "fulfill its obligations under TSCA to assess all reasonably foreseeable risks and protect vulnerable populations from the growing threats posed by climate change."

The SACC noted that the exclusion of extreme data is not unusual in hydrologic and fate and transport analyses, but the rationale for excluding the largest release of 1,1-dichloroethane is not well developed and seemingly based only on the release occurring as a result of a hurricane, despite the known hurricane frequency for the location and projections for increased hurricane frequency. The SACC suggested that "if there were other unique conditions resulting in the release that occurred simultaneously with the hurricane, there [would be] the potential to make a case to exclude the release from the analyses."

The SACC agreed that EPA should include "additional information regarding the 2020 release from the Lake Charles facility" in Section 3.3.3.2.1, such as "actual release amounts in the text and additional descriptions of the event surrounding the 2020 release(s)." The SACC recommended EPA provides more developed rationale and "clear justification for inclusion or exclusion of extreme data."

EPA Response: In the Risk Evaluation, EPA included a storm scenario (Section 3.3.3.2.3) to describe impacts of releases during storm events at a facility in Lake Charles, Louisiana. For this facility specifically, EPA is presenting two surface water exposure scenarios: one that is representative of storm events and includes the highest release data, and one that is representative of normal operating conditions. EPA is including a storm scenario for this specific facility because there are available release data showing releases of 1,1-dichloroethane across multiple storm events over the release years assessed. The storm scenario described in the final risk evaluation is specific to this facility and is not a generic scenario applied to other storm releases at other facilities. EPA used USGS, TRI, NEI, and DMR databases to develop its release assessment. EPA considers data provided in these databases represent

reasonably available data. EPA added all reported release data from 2016 to 2021 for the Lake Charles facility in Section 3.3.3.2.3.

The 1,1-dichloroethane risk assessment does include some of the same principles that the SACC stated are in the CWA's risk determination framework. For instance, the 1,1-dichloroethane risk assessment considers frequency of past discharges, extreme weather events, and facility-specific release information. Consideration of age of equipment, as suggested by the SACC, is beyond the scope of this risk evaluation. EPA evaluated exposure scenarios where designated water use was considered. Specifically, EPA estimated drinking water exposures for those facility effluents containing 1,1-dichloroethane discharged to receiving water bodies upstream of drinking water intakes. Thus, waterbodies designated as drinking water source water were considered in the risk evaluation.

EPA estimated the concentration of 1,1-dichloroethane in surface water based on reported releases and the flow data of receiving waterbodies as found in NHDPlus. For the storm scenario EPA assumed the normal receiving waterbody, the Bayou Verdine, during a flood will be overtaken by the flow of the Calcasieu River at its confluence. Thus, the Calcasieu River flow was used in the storm scenario.

Comment 3.2.4

Summary: The SACC questioned whether, in Appendix F at Lines 13009 to 13010, the exclusion of release data from 2020 should be specified in lines 13009 and 13010 if it were not used from the facility in Lake Charles.

The SACC noted that Lines 13144 and 13145 in Appendix F "state exposure levels are derived from aqueous concentration estimates that assume the entire annual load of 1,1-dichloroethane is released from the facility at [a] single time."

EPA Response: EPA revised Appendix E in the Risk Evaluation to include all release data from 2016 to 2021 for the Lake Charles facility.

EPA also revised language in Appendix E in the Risk Evaluation to clarify that for the storm event scenario, EPA used the 2020 storm duration and release data provided by the facility to estimate potential exposures (Section 3.3.3.2.3). For other releases, release durations corresponded to facility operating days.

Comment 3.2.5

Summary: The SACC noted that the use of facilities with storm-related release data is appropriate given the availability of data including the facility's operating days and stated that the effects of weather conditions "should be incorporated into models for hazard and risk in a geographic region" as well as "proactive prediction of risk to PESS communities, the ecosystem, and wildlife."

The SACC emphasized that 1,1-dichloroethane volatilizes to the air and that raises the question of how significant concentrations get to waterways (see Section 3.3). The SACC noted that air deposition from facilities releasing 1,1-dichloroethane are thought to be an important source to the indoor environment and these air depositions can increase the exposure of nearby PESS communities, ecosystems, and wildlife as well as from volatilization from water or soil.

The SACC drew attention to the fact that EPA's response to the inclusion or exclusion of the Lake Charles data will impact the data in Figures 3-12 and 3-13. The SACC recommended including notes on Figures 3-12 and 3-13 about "specific releases from facilities and their locations." The SACC supported the inclusion of the range and frequency of values in these Figures.

The SACC noted in Figure 3-12 that the extreme event measurements are almost 3 orders of magnitude greater than the tail of what appears to the typical range of measurements, while in Figure 3-13, the extreme event is an order of magnitude greater than the next highest value for the modelled releases.

The SACC sought clarification in the text about the y-axis of both Figures 3-12 and 3-13 and if they represent the frequency of occurrence, given that "the total is much greater than of 100 percent, or if the values are based on a number of observations at each set of concentrations. The SACC wanted to confirm if the extreme events are the single observations that are the last three datapoints at the highest concentrations. The SACC recommended including "graphs based on percent or probabilities [to be] more informative for understanding release events."

The SACC sought clarification on how to consider the probability and weight of the extreme events. The SACC suggested inclusion of toxicity data to calculate toxicity reference values (TRVs) to provide a risk context. The SACC specifically sought clarification on if the proposed TRV for the situation in Figure 3-13 is higher than 10^6 (µg/L) water concentration or if it is 10^{-2} (µg/L) to determine the relevance of the two highest loading values.

The SACC noted a discussion of uncertainty in the surface water modeling should include discussion of whether the period from 2015 to 2020 was typical; whether there are market or other forces that would change production, given that industries change over time; and whether the upper tails of these distributions were likely to increase, given that the number of violent storms in the U.S. Gulf region are likely to increase in the near future.

EPA Response: In the final 1,1-dichloroethane risk evaluation, EPA included a storm scenario (Section 3.3.3.2.3) to describe impacts of releases during storm events at a facility in Lake Charles, Louisiana. For this facility specifically, EPA is presenting two surface water exposure scenarios: one that is representative of storm events and includes the highest release data, and one that is representative of normal operating conditions. EPA is including a storm scenario for this specific facility because there are available release data showing releases of 1,1-dichloroethane across multiple storm events over the release years assessed. The storm scenario described in the final risk evaluation is specific to this facility and is not a generic scenario applied to other storm releases at other facilities. EPA used USGS, TRI, NEI, and DMR databases to develop its release assessment. EPA believes the data provided in these databases represent reasonably available data. EPA added all reported release data from 2016 to 2021 for the Lake Charles facility in Section 3.1.1.2.3.

There are significant concentrations of 1,1-dichloroethane in water due to direct discharges to water from TSCA reporting facilities. When released directly to surface water, 1,1-dichloroethane is expected to remain in water due to its water solubility. EPA agrees that air deposition is an important pathway and considered it in Sections 2.2.2, 3.3, 4.1, 4.2, 4.3, 5.1.2, and 5.3.3 of the Risk Evaluation.

EPA confirmed that Figure 3-12 contains data relating to the Lake Charles storm releases. A note was also added to the figure to clarify the meaning of the y-axis as frequency of released 1,1-dichloroethane into corresponding receiving water bodies. Figures 3-13 was deleted since the 1-day release scenario was modified to operating day releases.

The ecological hazard thresholds that are relevant to surface water concentrations are aquatic concentrations of concern (COC). TRVs are typically set for terrestrial hazard thresholds. For 1,1-dichloroethane, the acute aquatic COC is 1,769 µg/L and the chronic aquatic COC is 93 µg/L.

EPA considers including data from just the most recent reporting year is insufficient as it will not provide any indication of how releases may vary from year to year. EPA's practice for risk evaluations is to include data from multiple years including the most recent 5-year period from when the analysis

began. For 1,1-dichloroethane, an additional year of data became available during the risk evaluation period, so the release data covered the most recent six years of reporting data.

Ambient Air

Comment 3.2.6

Summary: The SACC recommended that "a color other than red should be used" for Figure 3-5 as it signifies danger which is not the intent of this figure. "Some members of the SACC recommend not including non-U.S. based data when there are U.S. data available."

The SACC noted, for Section 3.3.1, that EPA's Ambient Monitoring Technology Information Center (AMTIC) website states one of the purposes of air monitoring data is to provide basic ground truthing for air quality models that are used for exposure assessments, source-receptor characterization, the development of emission control strategies, and related assessments of air toxics program effectiveness.

The SACC stated that it is important to note that Texas, along with EPA, has an extensive stationary air monitoring network since approximately 30 percent (7 out of 23 facilities) of the facilities reporting 1,1-dichloroethane releases to TRI are in the State of Texas. The SACC noted that in the years between 2015 and 2024, there were approximately 45 stationary ambient air monitors across the state measuring 24-hour concentrations of 1,1-dichloroethane and that 1,1-dichloroethane ambient air data can be downloaded from the Texas Air Monitoring Information Network (access June 12, 2025).

The SACC also noted that over 99 percent of the samples analyzed for 1,1-dichloroethane at approximately 45 sites across Texas measure no 1,1-dichloroethane as shown in the state summary tab in the Supplemental information file: Ambient Monitoring Technology Information Center (AMTIC) 1,1-dichloroethane Monitoring Data 2015-2019.

The SACC believed it would be helpful to include an evaluation of air monitoring data from the Texas Air Monitoring Information System dating back to 1994, the Texas Commission on Environmental Quality's regional air quality monitoring network, and the EPA air monitor at Westlake for facilities in the Lake Charles vicinity, although summary statistics in the report state that over 99 percent of the data in Louisiana do not measure 1,1-dichloroethane. The SACC noted that even though no general population non-cancer or cancer inhalation risks are anticipated, as stated in Section 5.3.3.2.2, the large amount of air monitoring data is important to acknowledge and include in this evaluation and better represent the general population's exposure to 1,1-dichloroethane.

The SACC suggested EPA clarify the statement that EPA focused on AMTIC data in Texas and Louisiana on Page 71 at Line 2143 because it is not clear how EPA focused on ambient air monitoring data from Texas and Louisiana in this assessment.

The SACC suggested EPA clarify if the data used in Table 3-8, Summary of Selected statistics of 1,1-dichloroethane ambient air concentrations (g/m3) from EPA Ambient Monitoring Technology Center are from across the U.S. or only from Texas and Louisiana, since line 2143 states EPA focused on data from Texas and Louisiana.

The SACC suggested EPA should discuss the extensive air monitoring data and use it to evaluate general population exposure based on Lines 2164-2165 in Section 3.3.1.2 that state "The specific methodologies used in this assessment to evaluate general population exposures to 1,1-dichloroethane in air are briefly described in Figure 3-6 and below." The Committee noted that if modeling is used, its

assumptions should be accurately described and include more worst-case assumptions that better assess PESS risks.

The SACC suggested EPA should not use data from Logue et al. 2010 in the comparison of the AERMOD modeled data to monitored data because it is outside the 2015 to 2020 range of monitored data on Page 75 at Lines 2256 to 2261.

The SACC recommended EPA "state that the maximum modeled concentration is similar to the maximum monitored concentration" at Lines 2323 to 2326. The SACC recommended EPA "include that over 95% of the monitored concentrations of 1,1-dichloroethane across the U.S. are non-detects." The SACC stated that "the modeled concentrations are used to assess lifetime exposure to 1,1-dichloroethane for 78 years and are not representative of general population exposure."

The SACC recommended adding the number of non-detects and the annual average monitored concentrations to Table 3-22. The SACC recommended that "units should remain consistent when providing air concentrations," with g/m3 or both ppb and g/m3.

The SACC highlighted, in Section 2.2.2 at Line 1480, that volatility is a key characteristic for this chemical that impacts the movement of the volatilized chemical from releasing sources, which could be influenced by wind patterns and seasonal and weather-related changes to ambient air in the surrounding environment and pointed to Figure 2-1 for a diagram of this distribution.

EPA Response: EPA revised the colors of Figure 3-5 in the Risk Evaluation to use of a gray scale. Additionally, EPA intends to keep the non-U.S. data in the tornado plot for transparency.

A review of the AMTIC archive data for the years 2015 to 2020 shows that data from the TAMIS are a part of the archive and are therefore included in this risk evaluation. EPA considered monitoring data from the AMTIC archive for the years 2015 to 2020 because it corresponds to the release data used in this risk evaluation. Use of monitoring data from previous years may not be indicative of current exposures as industrial pollution control measures and standards may have changed. Further EPA did consider and acknowledge the large amount of monitoring data in this evaluation. A summary of the data considered from the AMTIC archive and peer-reviewed publications is included in Section 3.3.1.1.

Consistent with the SACC's suggestion, EPA removed the clause stating, "EPA focused on AMTIC data in these states" as Table 3-8 includes all reported data, not just those from Texas and Louisiana.

The ambient air modeling method is described in detail in Appendix D. Strengths, limitations, and sources of uncertainty in the ambient modeling method are described in Section 3.3.5.1.

The modeled annual average concentrations presented in Section 3.3.1.2 represent 95th percentile exposure scenarios and are modeled for distances as close as 10 m from the release site. These scenarios represent high-end exposure scenarios to better assess PESS risks. This has been clarified in the document.

As stated in Section 3.3.1.2 of the Risk Evaluation, the Lake Charles, Louisiana, meteorology site was only used for the two Occupational Exposure Scenarios (OESs) where there were no site-specific data (Commercial use as a laboratory chemical and Processing – repackaging) and for the facilities that were located in the vicinity of the Lake Charles, Louisiana, meteorology site. Table 3-12 only shows data for these two OESs.

EPA agrees with the SACC that the Logue data is not useful for this comparison because it is outside the 2015 to 2020 time range of monitored data. Discussion of the Logue data has been removed from comparison of modeled concentrations.

EPA made the suggested edit by the SACC at lines 2323 to 2326 of the draft risk evaluation to state that approximately 95 percent of the monitored concentrations of 1,1-dichloroethane reported in the AMTIC archive are non-detects.

In the final risk evaluation, EPA is using 78 years for lifetime inhalation exposure in response to prior SACC recommendations (U.S. EPA, 2011). By assuming a lifetime exposure of 78 years, EPA is likely to capture exposure to PESS that live near releasing facilities for an entire lifetime.

In Table 3-20 of the Risk Evaluation, EPA compares 95th percentile modeled concentrations to maximum measured ambient air concentrations for a specific facility.

EPA provided unit conversion formulas in the risk calculation spreadsheets that are included as part of the supplemental files.

Comment 3.2.7

Summary: A public commenter (0066) wrote that the air dispersion analysis does not accurately characterize ambient air exposure based on the uncertainties and conservatisms related to the air dispersion modeling. The commenter said that the risk calculations for ambient air exposure are questionable due to the lack of site-specific source data, conservative assumptions, and the use of an accuracy level that is consistent with screening modeling. The commenter suggested improving the modeling by using meteorological data representative for each facility in the modeling, collecting accurate source data for the emission sources included in the modeling, and correctly locating the sources at each facility.

The SACC stated that the assumption that the meteorology for Lake Charles, Louisiana is used for all facilities should be stated in the text and justified beyond the note on Table 3-12 because it appears to have been applied to all air modeling without explanation. The SACC noted the data was found in the supplemental file "Draft Risk Evaluation for 1,1-dichloroethane Supplemental Information File: Supplemental information on IIOAC TRI Exposure and Risk Analysis."

EPA Response: For the modeling of ambient air concentrations, EPA used site-specific data where available. For the two OESs where site-specific data were not available (Commercial use as a laboratory chemical, and Processing – repackaging for laboratory chemicals), EPA estimated releases were modeled with two meteorological stations, Sioux Falls, South Dakota, for central tendency meteorology, and Lake Charles, Louisiana, for higher-end meteorology. These two meteorological stations represent meteorological datasets that tended to provide high-end (Lake Charles, Louisiana) and central tendency (Sioux Falls, North Dakota) and high-end concentration estimates relative to the other stations within IIOAC based on a sensitivity analysis of the average concentration and deposition predictions conducted in support of IIOAC development, as described in Section 3.3.1.2.2 and Appendix D.1.2. Table 3-12 only shows data for these two OESs. EPA acknowledges that there are uncertainties in the air dispersion modeling and considered these uncertainties in the weight of scientific evidence (Section 3.3.5.1).

Surface Water

Comment 3.2.8

Summary: The SACC requested that EPA clarify the statement: "It is important to note that some low hydrologic flow values were applied to these facility releases, which increases the concentration estimates," in Section 3.3.3.2.3 Model estimates from point source calculator, with rationale for why and when low flow values were applied.

The SACC requested EPA include data from state level monitoring of public water systems, such as that from Texas, in addition to UCMR3 data for evaluating general population risks from drinking water ingestion or fish ingestion in Section 3.3.3.5, though no general population risks were identified, as stated in Section 5.3.3.2.2. The SACC noted that Texas data are available through Texas Drinking Water Watch at https://dww2.tceq.texas.gov/DWW/ and that other states likely collect similar data. The SACC thought EPA should be able to fairly easy collect and evaluate state-specific public water system data for measured drinking water concentrations of contaminants to use as monitoring data "to verify and compare with modeled drinking water concentrations" in this assessment. The SACC noted that 1,1-dichloroethane was not measured in any public water system from 2015 to 2020, which the SACC stated was important given that "30% of facilities that report releases of 1,1-dichloroethane to TRI are in Texas" which could be used to "assess the risk to the general population and the population that gets their drinking water from regulated systems in Texas."

The SACC noted EPA's use of Figure 3-10, Concentrations of 1,1-dichloroethane in surface water from U.S.-based and International Studies, 1984 to 2005, was not useful for the purposes of this risk evaluation and additionally requested EPA to not use red in this and other figures, "as it signifies danger which is not the intent of this figure."

The SACC requested EPA clarify what is meant by the phrase "Includes sites in DMR that reported releases of 1,1-dichloroethane below the limit of detection" in Table 3-4, specifically to detail what medium the limit of detection is measured in and how a facility reports a release if it cannot be detected.

The SACC asked EPA if the 0.25 µg/L value at Line 1509 (the median concentration of 1,1-dichloroethane in ambient surface waters from 2015 to 2020) is a low concentration.

The SACC recommended EPA "add delimiters such as days, hours, times to the values" in Table 2-2 and "clarify whether removal in wastewater is affected by the initial concentration."

EPA Response: EPA considers releases to surface water under normal operating conditions and receiving waterbody low flow conditions for ecological exposure assessments (7Q10) and for human health exposure assessments (30Q5). EPA assumes low flow scenarios because they produce higher-end concentrations of 1,1-dichloroethane in receiving waters and are therefore representative of high-end exposure scenarios.

EPA acknowledges that states, including Texas, maintain Drinking Water Watch databases that monitor chemicals such as 1,1-dichloroethane. To assess concentrations of 1,1-dichloroethane EPA used the UCMR database, which provided nationwide sampling and concentration data for 1,1-dichloroethane, including select Texas public water systems. For this risk evaluation, EPA considered the UCMR data to be comprehensive enough to not necessitate the use of the state Drinking Water Watch databases.

EPA is not inclined to update the colors in Figure F 3-10 or other figures. The data in Figure 3-10 provides results of systematic review of published literature and is presented for transparency.

EPA provided details on how DMR data were accessed and analyzed, including its method for handling reported non-detects, in Section 3.1.1.2.2. The footnote in Table 3-4 was revised to reference Section 3.1.1.2.2.

It is difficult to apply qualitative descriptors like "low" to concentrations in the context of a risk evaluation without an exposure scenario. Sections 4.1 and 5.1.2 present ecological and human surface water exposure estimates from TSCA COU releases.

Removal efficiencies in wastewater treatment are not typically described with delimiters of days or hours. EPA did not find evidence that the initial concentration affected removal efficiency. EPA is assuming that influent concentrations will affect removal efficiencies if influent concentrations are high enough to be toxic to the microorganisms in the wastewater treatment plant. The maximum influent concentration measured in the 40 POTW study was 27 µg/L and at this concentration, 1,1-dichloroethane was not toxic to the microorganisms present in the wastewater treatment process.

Groundwater

Comment 3.2.9

Summary: The SACC said EPA did not consider the possibility that 1,1-dichloroethane, as a solvent or chemical intermediate, could enter confined or unconfined groundwater aquifers via underground leakages.

The SACC suggested EPA consider including modeling of 1,1-dichloroethane concentrations directly discharged into groundwater in confined aquifers, in addition to models it already performed such as for 1,1-dichloroethane as landfill leachate. The SACC noted that due to the chemical properties of 1,1-dichloroethane, it is likely to accumulate in confined aquifers that lack mass exchange with air, which a SACC member modeled using PROTEX (Zhang et al., In Press; Li et al., 2018).

The SACC expressed concern that EPA's 1,1-dichloroethane groundwater concentration was not conservative enough and the value EPA used is far below measured concentrations in groundwater samples, which are mostly above 1 µg/L and can reach as high as 1,900 µg/L in some samples (see Figure 3-18). The SACC noted EPA's modeling results may underestimate the actual exposure risks of PESS and other populations who live close to underground storage tanks and rely on groundwater as their source of drinking water. The SACC also noted that contaminated groundwater could discharge into surface water and create additional exposure risks.

The SACC appreciated EPA's use of the Level III model within the Estimation Program Interface Suite to assess multimedia mass distribution of 1,1-dichloroethane but expressed regret that the model lacks the ability to capture mass accumulation in groundwater.

The SACC recommended EPA review the concentration values in Figure 3-18 in the draft risk evaluation for accuracy, such as the discrepancy between the highest concentration value in the Figure of 1,900 µg/L from Chen and Zoltek (1995) and the value from the article of 10.84 µg/L. The SACC also asked EPA if that concentration of 10.84 µg/L is relevant because it was detected in 1992 in a monitoring well near a landfill in Florida.

The SACC asked EPA at Line 1567 if the presence of 1,1-dichloroethane in groundwater suggests that there would be a presence in soil.

EPA Response: EPA performed quantitative land pathway exposure assessments for releases relevant to TSCA. Past sources of legacy groundwater contamination (*i.e.,* disposals that have already occurred) are not COUs under TSCA and are therefore not within the scope of the risk evaluation. Based on reasonably available information, EPA also found no evidence to indicate that present-day leaks of 1,1-dichloroethane from underground storage tanks are known, intended, or reasonably foreseen to occur, and therefore does not consider such leaks to fall within a COU for 1,1-dichloroethane, and did not assess them in the 1,1-dichloroethane risk evaluation.

EPA performed a screening to model possible concentrations of 1,1-dichloroethane in wells within one mile of a disposal facility using the Delisting Risk Assessment Software (DRAS). In this assessment, EPA modeled leachate concentrations up to 100 mg/L and loading rates up to 1,000 kg/year, far below the TRI maximum reported annual land release of 5 pounds from 2015-2020. The analysis found that landfill leachate did not result in risk from general population exposure; therefore, there was not a need for additional refined modeling. EPA acknowledges the additional tool provided by the SACC could be used to model 1,1-dichloroethane in confined aquifers but determined that the groundwater modeling that was performed represented a conservative scenario and that additional modeling was not necessary for this evaluation.

There was an error in Figure 3-18 of the draft risk evaluation and the concentration from the Chen and Zoltek (1995) study was reported as 3 orders of magnitude higher than what was stated in the study. The highest groundwater concentration extracted from peer-reviewed literature during systematic review was 1.9 g/L (Sabel and Clark, 1984), as stated in the text. The figure, available in the Risk Evaluation, has been updated to reflect the correct concentrations and an additional citation was added to the text for clarification. EPA reviewed the data on groundwater concentrations resulting from Florida landfill leachate in 1992 and determined that they were not appropriate for use in exposure estimates.

The presence of 1,1-dichloroethane in groundwater does suggest that it will be present in soil; however, the log K_{OW} and solubility of 1,1-dichloroethane suggest that it will likely be in the aqueous phase and mobile in the subsurface. EPA identified limited monitoring data of 1,1-dichloroethane in soils and soil-water leachate (Appendix C.3.3). Due to the limited monitoring data, EPA conducted a quantitative land pathway exposure assessment (Section 3.3.4) in order to confirm the levels of 1,1-dichloroethane in soils that children could be exposed to via soil ingestion (Section 3.3.4).

Terrestrial and Aquatic Species

Comment 3.2.10

Summary: The SACC recommended EPA provide more information about "how proximity to release sites is incorporated into the models and estimates of hazard and risk," especially for terrestrial and aquatic species. The SACC also recommended EPA acknowledge the impacts of the lack of data on environmental models for terrestrial and aquatic species. The SACC recommended EPA provide a discussion about "the relationship of human health data to potential risks to wildlife and as an indicator for adverse effects on ecosystems." The SACC noted that the human health aspects of models, for PESS and other populations, are explained in detail.

The SACC noted that terrestrial receptors in Figure 1.5 receive input from a variety of sources while aquatic receptors higher on the food chain in Figure 1.5 (barracuda and other predatory species such as fish-eating birds and mammals) may experience biomagnification.

The SACC asked EPA if, in Section 2.2.2 Summary of Fate and Transport Assessment, at Lines 1534 to 1535, there are "monitoring data available for soils pertaining to terrestrial vertebrates, not only to humans."

EPA Response: Proximity to the release site is incorporated by the assumption that aquatic exposures in receiving water occur at a facility's point of discharge. This is a reasonable assumption as aquatic species are spatially distributed within receiving streams and are exposed to the chemical at the point of discharge as well as exposed to more diluted concentrations downstream of a facility's effluent discharges. For exposure to terrestrial animals, the primary exposure route was via air deposition to soil

from reported 1,1-dichloroethane facility emissions (Section 4.1.3.2). Deposition rates were estimated using AERMOD and were calculated at discrete distances to the release sites. Exposures were calculated using the highest deposition rates regardless of distance from the facility.

Biomagnification was considered in the trophic transfer assessment in Section 4 and did not result in unreasonable risk to aquatic receptors higher on the food chain.

EPA presented all relevant data on 1,1-dichloroethane in soils that was identified during systematic review in Section 2.2.2.

Other Comments

Comment 3.2.11

Summary: The SACC noted that the variations in the measured concentrations on Page 88 may be due to environmental conditions.

EPA Response: EPA would like to clarify that the concentrations discussed on Page 88 of the draft risk evaluation are modeled, not measured. EPA agrees that 1,1-dichloroethane surface water concentrations may vary with environmental conditions. For 1,1-dichloroethane, receiving waterbody flow rate is generally the primary environmental factor affecting 1,1-dichloroethane surface water concentrations as other fate processes, such as partitioning to sediment, are not as significant. To characterize the range of possible concentrations resulting from facility reported releases, EPA considered several different flow conditions (harmonic mean, 30Q5, and 7Q10) for the corresponding receiving waterbodies.

Comment 3.2.12

Summary: The SACC requested EPA use the extensive ambient air, surface water, groundwater, and public water system monitoring data to ground-truth the modeling of 1,1-dichloroethane in those media and enhance the accuracy of 1,1-dichloroethane's potential impacts to human health and the environment.

The SACC asked EPA if the concentration data on Page 89 are within the predicted solubility or if there will be consideration of the effects of weather and other environmental conditions on the models. The SACC also extended the same questions to benthic community exposures and concentrations in sediment with consideration of rain events.

EPA Response: EPA used AERMOD to model ambient air concentrations. AERMOD has undergone extensive peer review and validation through comparison with monitoring data. In Section 3.3.5 and throughout the draft risk evaluation, EPA compared monitoring data to AERMOD modeled data to demonstrate overlap and reinforce EPA's high confidence in the modeled results.

EPA reviewed a number of surface water monitoring data and did not find data that was temporally or spatially aligned with TSCA facilities releasing 1,1-dichloroethane into surface waters. EPA, therefore, estimated 1,1-dichloroethane surface water concentrations based on reported releases as well as reported receiving water body reaches that were then found in NHDPlus for corresponding flows. The two parameters of releases and flow rates are the primary drivers in predicting surface water concentrations.

The highest concentration referenced on Page 89 of the draft risk evaluation is 913 µg/L, which represents the 95th percentile modeled concentration and is well below the water solubility of 5,040 mg/L at 25 °C.

Section 4 – Environmental Risk Assessment

Comments associated with this issue are summarized in the subsections below.

Section 4.1 – Environmental Exposures

Comment 4.1.1

Summary: A public commenter (0064) said that inhalation exposure for wildlife and domestic animals is unavoidable and commented that EPA's Wildlife Exposure Factors Handbook provides respiration rates for terrestrial animals that could assist in evaluating the risks to terrestrial wildlife from volatile pollutants. The commenter also supported using the Tribal-Focused Environmental Risk and Sustainability Tool to better understand the protective relationship that tribal people have with wildlife resources.

EPA Response: For 1,1-dichloroethane, inhalation exposure is expected to be secondary to dietary exposure for terrestrial wildlife. Current EPA guidance on relative risk evaluation for wildlife shows inhalation exposures are relatively small compared to oral and dietary exposures. In support of this conclusion, no inhalation risk was indicated to the general population in the draft 1,1-dichloroethane risk evaluation when using human health hazard thresholds based on read-across data. Additionally, no dietary risk was indicated for terrestrial wildlife. See Section 4.3.4 of the Risk Evaluation for 1,1-Dichloroethane (U.S. EPA, 2025d).

EPA considered exposures and risks to tribal nations from 1,1-dichloroethane. EPA estimated tribal rates of fish consumption to estimate any risks and concluded that risk was not indicated for tribes from the highest exposure scenario. Based on the ecological assessment, tribal exposures to 1,1-dichloroethane from wildlife are not expected to result in risks since risks to wildlife were not identified.

Section 4.2 – Environmental Hazards

Toxicity Data

Comment 4.2.1

Summary: The SACC agreed that toxicity assay data should be considered in analog selection. The members suggested that EPA "[e]valuate relevant assay data on toxicity endpoints to better identify analogs for [1,1-dichloroethane]. If the differences in toxicity assay responses exist among analogs, perform further analysis to reduce uncertainties."

The SACC found the studies used in the review of toxicity data had benefits and shortcomings. The SACC said that certain studies had issues such as low replicability or high volatilization of the test material, while others had information mainly drawn from hypothesis testing derived No Observed Effect Concentration/Lowest Observed Effect Concentration. The SACC said that the confidence intervals were large for the ECx values derived from the Effect Concentration, and a limited range of concentrations were tested.

EPA Response: Regarding toxicity assay data, the assays provided in the SACC Final Report are outside the scope of the environmental assessment due to being human assays. EPA agrees mechanistic data can be useful, as demonstrated in a phthalate read-across using tPODs and mPODS (U.S. EPA,

2025a), but there is not sufficient evidence that the mechanism tested in human toxicity assays would be the same in ecological receptors.

EPA used studies that received high or medium overall quality determinations during systematic review. Systematic review takes into account considerations such as replicability, volatilization, and the range of concentrations tested (*Risk Evaluation for 1,1-Dichloroethane Supplemental File: Systematic Review Protocol* (U.S. EPA, 2025d)). The Agency used the best science that was available to assess environmental hazard.

Comment 4.2.2

Summary: The SACC approved of use of EPA's Web-based Interspecies Correlation Estimation application (Web-ICE) to generate a species sensitivity distribution of toxicity data. The Web-ICE method was a helpful extrapolation tool, which in this case derived species sensitivity distributions from EC50 estimate values and the Quantitative Structure-Activity Relationship (QSAR) model. A total of 13 studies about aquatic systems were used, 5 specific to 1,1-dichloroethane and eight from approved analogs. The SACC said that "[g]iven the limited dataset for 1,1-dichloroethane, consider enhancing species sensitivity distributions by integrating toxicity estimates cautiously, as these values may correlate closely due to [QSAR]-derived mathematical functions."

EPA Response: The Agency agrees that Web-ICE is a helpful extrapolation tool. EPA uses Web-ICE to supplement limited datasets used in an SSD, which requires a minimum of eight species. There were a total of four species with empirical EC50 values available to generate the 1,1-dichloroethane SSD, necessitating the inclusion of estimated EC50 values procured from Web-ICE. The Agency followed the guidance developed by Raimondo (U.S. EPA, 2024b; 2010) when determining which toxicity estimates were appropriate to integrate with empirical toxicity endpoints in the SSD for 1,1-dichloroethane. Web-ICE toxicity correlations are based on least squares regressions developed from empirical data (U.S. EPA, 2024b). While QSAR estimates can be used as inputs to generate Web-ICE predictions (U.S. EPA, 2024b), EPA did not employ this approach in the 1,1-Dichloroethane Risk Evaluation. Only empirical EC50 values were used as inputs.

Read-Across Approach

Comment 4.2.3

Summary: In multiple submissions to the docket (0053, 0066), a public commenter said they agree with the comprehensiveness of charge question 2 on the read-across approach. The commenter recommended that the charge question also incorporate information on which settings were selected by EPA to run each of the selected tools and add more information on the analog selection process, including which analogs were identified from each tool. The commenter also stated that the Analog Identification Methodology (AIM) tool was deemed of questionable utility for the specific assessment of 1,1-dichloroethane and EPA should include detailed information on how the AIM tool was used and list all the analogs that were identified.

A public commenter (0052) said that the charge questions for read-across for ecotoxicity should include whether EPA has sufficiently considered the relative potencies of the dose-response relationships. In another submission to the docket (0063), the same commenter said that EPA should rely on its decades of experience regarding the aquatic toxicity of nonpolar organic chemicals when faced with data gaps.

The SACC approved of the read-across approach used to select analogs of 1,1-dichloroethane. The approach considered structural and property similarity of analogs, and the steps followed were reasonable and transparent. The methods applied to estimate environmental toxicity of 1,1-dichloroethane and the inclusion of other materials are vital to supplying information regarding environmental toxicity. Leave-one-out approaches, whereby data from analogs are excluded, can be done to answer the question in a quantitative and empirical manner. The SACC believed the overall analysis was not consistently documented in a quantitative manner, which contributed to uncertainty in the analysis. The SACC suggested that EPA "[i]nclude additional analogs based on biosimilarity, response similarity, and mechanistic similarity, beyond just structural and property similarities, to improve the robustness of the read-across method." Additionally, the SACC said that "the selection of analogs should consider more knowledge of toxicity potency and endpoints in addition to structures and properties when there are experimental data available. […] When selecting analogs, all experimental toxicity data should be incorporated into the final decision. If there are different responses in toxicity assays, additional analysis should be considered to reduce uncertainties in the final conclusion." Very small changes in chemical structure can dramatically impact biological activity. The SACC indicated uncertainty increases when extrapolating potential hazard and risk evaluations for species where limited data was available.

The SACC agreed that the Ecological Structure Activity Relationships model predictions justified using the read-across approach. Additionally, according to the SACC, there was enough data for 1,2-dichloroethane to establish similarity in biological actions and effects from *in vitro* and *in vivo* metabolism studies, however not enough data for non-rodent and non *in vitro* tests. Therefore, the SACC said that the data can indicate adverse effects, however strong conclusions for assessing risk should not be drawn.

The SACC found that EPA's presentation indicated the uncertainty of estimating ecological risk based on the limited data for classes of organisms. The Committee said that two studies discussed contained some flaws, while also presenting some valuable information regarding similarities and differences in toxicity between 1,1-dichloroethane and 1,2-dichloropropane.

EPA Response: The tool settings were described in the text of the Draft 1,1-Dichloroethane Risk Evaluation and are also now added in Table 4-3 in Section 4.2.1.1.1 for clarity of the final risk evaluation. The list of analogs identified from the structure program post filtering have been added to Section 4.2.1.1.1. The version of AIM that was used as one of the structure programs to identify analogs is housed on the Confidential Business Information (CBI)-LAN; however, no CBI was included in the results presented in the 1,1-Dichloroethane Draft Risk Evaluation. EPA's TSCA New Chemicals Program uses CBI-AIM to identify analogs with data (including analogs with CBI). CBI information is not found in the public-facing version of AIM in order to protect business confidentiality, consistent with TSCA Section 14, and CBI-AIM has undergone updates not found in the public-facing version of AIM with the latest applied to the non-CBI-AIM platform in 2012 and CBI-AIM updated in 2016 in relation to data sources from other EPA programs.

EPA did not change the charge questions as a result of the comments received from Commenters 0052 and 0063. However, during the SACC review of the 1,1-dichloroethane draft risk evaluation, the ecotoxicological similarity line of evidence was discussed, including potencies of the target (1,1-dichloroethane) relative to that of its analogs. Regarding content in the draft risk evaluation, EPA did consider potency differences between 1,1-dichloroethane and its analogs in the form of hazard comparisons (predicted and empirical). EPA chose a read-across approach for aquatic environmental hazard to address data gaps. Additionally, EPA compared ECOSAR toxicity predictions for 1,1-dichloroethane (which draw upon decades of environmental hazard data for neutral organic chemicals)

to measured environmental hazard data for 1,1-dichloroethane and its analogs. 1,2-Dichloroethane was ultimately not selected for use as an analog in the environmental risk assessment, and thus was not a basis for environmental risk assessment conclusions.

The read-across approach employed by the Agency considered not only structural and property similarity of the analogs, but additionally considered toxicological similarity as well as analog data availability. Although a formal "leave-one-out" approach was not used, the Agency selected analogs which resulted in the highest confidence based on multiple lines of evidence. Confidence and uncertainties are now characterized in Section 4.2.1.1.4 for both the selected analogs (1,2-dichloropropane and 1,1,2-trichloroethane) as well as analog candidates that were not selected.

It is not clear in the SACC Final Report which two studies the SACC was indicating, but potentially they were referring to two studies which were mentioned in EPA's presentation (Tsai and Chen, 2007; Könemann, 1981). If so, then the Agency agrees that the studies contain flaws but were useful in the analog selection.

Representative Species

Comment 4.2.4

Summary: The SACC found that the use of representative species was appropriate. However, they cautioned that the approach should be used conservatively and acknowledged that there can be problems with generalizing effects between widely divergent species and genera. The SACC said that the available data demonstrated that the transfer of 1,1-dichloroethane is unclear in the environment. One member agreed with EPA that the weight of scientific evidence is moderate. The SACC suggested that EPA "[u]se a conservative approach for representative species in environmental assessments, acknowledging potential issues in generalizing effects across species and genera."

EPA Response: The Agency carefully selected representative species for use in the trophic transfer, and their use in the trophic transfer was conservative. A tiered approach was used for the trophic transfer assessment, with the first tier employing a conservative scenario. No unreasonable risk was observed as a result of trophic transfer; thus, refinement was not warranted. The use of representative species in the trophic transfer is discussed in the weight of scientific evidence in Section 4.1.5.2.

Other Recommendations

Comment 4.2.5

Summary: The SACC made the following recommendations:

- "Increase Transparency and Quantify Uncertainties: Document uncertainties in a quantitative manner for sources, types, and magnitudes, to improve clarity in risk assessments and communicate limitations effectively.
- Consider Age of Studies and Test Conditions: Note the limitations of older studies (from the 1980s), where issues like test material volatilization may have impacted toxicity detection and include newer studies if available.
- Clarify Data Limitations and Monitoring Needs: Address if the observed low concentrations of [1,1-dichloroethane] in environmental assessments are due to limited studies or lack of monitoring data (Section 4.1.2 in the draft risk evaluation for [1,1-dichloroethane])."

EPA Response: Strengths and uncertainties are documented in four locations throughout the environmental risk assessment Section of the 1,1-Dichloroethane Risk Evaluation (see Sections 4.1.5, 4.2.1.1.4, 4.2.4, and 4.3.5). The read-across weight of scientific evidence (Section 4.2.1.1.4) was not originally included in the Draft Risk Evaluation for 1,1-Dichloroethane but was added to the Risk Evaluation for 1,1-Dichloroethane to improve clarity.

Study limitations were considered during systematic review and in the environmental hazard weight of scientific evidence in the Draft Risk Evaluation for 1,1-Dichloroethane (see Section 4.2.4). All studies that were included in the draft risk evaluation underwent systematic review. Study quality was determined for each reasonably available study during systematic review, which accounts for issues such as test material volatilization. Additionally, it is noted in Section 4.2.2 of the Risk Evaluation for 1,1-Dichloroethane whether measures were taken to account for volatility such as measuring test concentrations in the exposure media, use of flow-through study design, and/or covering containers under semi-static or static exposure conditions. One new environmental hazard study (Smithers, 2024) was incorporated in the Risk Evaluation for 1,1-Dichloroethane.

There were limited data on measured tissue concentrations. The calculated biota tissue concentrations are not a function of measured biota tissue concentrations. The calculations for biota tissue in the Risk Evaluation for 1,1-Dichloroethane use modeled media concentrations multiplied by the bioconcentration factor (BCF). Although the measured concentrations do not directly impact the calculated concentrations, measured and calculated biota tissue concentrations are considered in the trophic transfer weight of scientific evidence in Appendix J.3.4 of the Risk Evaluation for 1,1-Dichloroethane.

Section 4.3 – Environmental Risk Characterization

Comment 4.3.1

Summary: A public commenter (0066) examined the surface water and sediment exposure risk assessment. The commenter agreed with EPA's conclusions that 1,1-dichloroethane is highly volatile at ambient temperature, is biodegradable in anaerobic water, is not bioaccumulative, and is hydrophilic, and 1,1-dichloroethane-containing wastes are treated before release into surface water. However, the commenter also stated that EPA adopted different approaches for its preliminary risk quotients depending on the exposed population and said that this approach fails to meet a standard of transparent, best available science. The commenter said that this is because the refined chronic exposures to ecological populations were based on the "beyond worst case" assumption that a facility's annual release was compressed into a 21-day release period while the refined human dietary consumption of fish estimates were based on the annual release to surface water averaged over the total number of operating days. The commenter said that while the choice to use the different averaging period due to the lifetimes of the organisms being assessed, the choices were not discussed as part of an uncertainty analysis and the increased conservatism towards "beyond worst case" is unlikely to be apparent to most readers.

EPA Response: EPA considered both hazard study-based release durations and total facility operating days release duration in the environmental risk assessment for both acute and chronic exposure to aquatic organisms. For aquatic organisms, the relevant chronic hazard study duration for 1,1-dichloroethane is 21 days. Total facility operating days per year can be estimated with confidence, however, there is uncertainty regarding the number of days per year a facility is releasing a given chemical. The two release durations—one based on the chronic hazard study duration and one based on total facility operating days—were selected to bound this uncertainty. The hazard study-based duration is not relevant to the human health risk assessment as it represents the exposure duration from the study

used to derive the chronic aquatic organism hazard threshold for use in the environmental risk assessment. The release duration scenarios used in the environmental risk assessment are described in Section 4.3 of the Risk Evaluation for 1,1-Dichloroethane.

Section 5 – Human Health Risk Assessment

Comments associated with this issue are summarized in the subsections below.

Section 5.1 – Human Exposures

Occupational Exposures

Comment 5.1.1

Summary: A public commenter (0063) stated that EPA's risk evaluation deviates from key risk and exposure assessment guidance. The commenter requested that EPA more closely adhere to its own guidance and best practice methods, adding that the risk evaluation will benefit from targeted information from industry stakeholders to provide a realistic picture of current conditions of use. The commenter further recommended that EPA reduce uncertainty in its assessments by performing targeted analyses to identify and assess similar exposure groups (SEG) within relevant conditions of use and exposure scenarios. The commenter added that the occupational exposure monitoring data generated under the 1,1-dichloroethane test order are of a high quality and likely reliable for use in exposure estimation in the draft risk assessment.

Additionally, the commenter provided several recommendations for the exposure assessment, including that EPA should: apply a tiered approach to human exposure assessment; refine its screening-level exposure estimates; use corroborating information from international occupational safety authorities to identify a hazard benchmark against which to compare occupational exposures; and conduct an independent, transparent, and public process to develop an occupational exposure limit. The commenter further recommended that future draft risk evaluations not be required to include an OEV, and that EPA establish an external process for reviewing and developing occupational exposure limits as necessary.

Another public commenter (0066) discussed that EPA determined cancer and non-cancer inhalation risks from acute, short-term, and chronic worker and occupational non-user exposures to 1,1-dichloroethane across the manufacturing, processing, and disposal conditions of use. The commenter stated that EPA considered SEGs in its evaluation of worker exposure risks for the Manufacturing and Processing as a reactive intermediate occupational exposure scenarios and recommended that EPA consider reported information on duration and frequency of tasks by SEGs to refine exposure estimates to reflect actual worker exposure potential.

EPA Response: EPA's intent in developing exposure assessments for risk evaluations is to be consistent with existing EPA guidance and welcomes any specific comments on inconsistencies that have been observed.

In the 1,1-Dichloroethane Risk Evaluation, EPA was able to use detailed information from a test order to assess inhalation exposure by similar exposure groups. EPA agrees with the commenter on this point and intends to continue to pursue this objective in future risk evaluations as appropriate based on the reasonably available information for a given chemical.

The commenter provided several suggestions on improvements to EPA's process for preparing exposure assessments for risk evaluations and, while EPA does not consider them necessary for this risk evaluation, EPA will consider these suggestions for future risk evaluations as relevant and appropriate.

With respect to the comments about occupational exposure values and limits, EPA provided public notice of its calculation of a risk-based occupational exposure value for 1,1-dichloroethane in Appendix

N of the draft risk evaluation and Appendix O of the Risk Evaluation consistent with 40 CFR 702.49(h). Any proposed occupational exposure limit would be developed as part of risk management rulemaking following the final unreasonable risk determination and would be subject to public notice and comment as part of the rulemaking process. During risk management rulemaking, EPA may take into account cost and other nonrisk factors, such as technological feasibility and existing occupational exposure control approaches and technologies. Risk evaluations, however, are required by TSCA section 6(b)(4)(A) to be conducted "without consideration of costs and other nonrisk factors."

EPA agrees that duration and frequency of tasks are important considerations for exposure assessment. EPA's practice is to first use monitoring data to assess exposure where the worker is sampled for the entire duration of the shift. This would include periods where the worker is conducting tasks such as sampling and loading into containers as well as periods where the worker is not directly interacting with the process. The 8-hour data is then a time-weighted average exposure over the entire shift. On the frequency of exposure, EPA's general practice is to assume that the days/year of exposure for an individual worker are equal to the number of operating days for the facility. EPA will use more specific data on the frequency of exposure for workers at a facility within an OES as it is available.

PESS and Tribal Exposures

Comment 5.1.2

Summary: A public commenter (0064) expressed support for EPA's efforts to quantify exposures and risks to Tribal populations via higher fish consumption and requested that EPA consider surface water exposure related to subsistence fish harvest practices in addition to recreational swimming to evaluate real-world exposures and risks. The commenter further stated that Tribal exposures differ from those of the general population, and that a default value of 78 years is more reflective of Tribal communities that may be chronically exposed to airborne contaminants from industrial facilities and landfills. The commenter expressed support for EPA characterizing lifetime tribal exposures from two facilities releasing 1,1-dichloroethane on the Navajo Nation.

Relatedly, a public commenter (0069) stated that EPA understates the duration of 1,1-dichloroethane in drinking water and fish, and the assumption that people will only be exposed for no more than 33 years violates the TSCA mandate to protect PESS with "greater exposure." The commenter said that EPA provides no support for its assumption that a change in address equates to a new drinking water supply or fishing location, nor does EPA provide an explanation for why fenceline communities facing up to 78 years of inhalation exposures may only eat fish from surrounding waters for up to 33 years. The commenter stated that the risk evaluation disregards SACC advice that the 33-year lifetime exposure estimate is not representative of Tribes and PESS communities.

EPA Response: EPA currently does have data needed to characterize an exposure scenario related to subsistence fish harvest practices.

EPA does not expect that 1,1-dichloroethane air emissions from landfills originate from TSCA COUs (Section 3.2.1.1). Also, EPA assumed that all disposal of 1,1-dichloroethane would be to lined, managed hazardous waste landfills or incinerators. In the draft risk evaluation, EPA did assume 78 years of exposure for inhalation and continues to do so in the final risk evaluation.

In the final 1,1-dichloroethane risk evaluation, EPA revised the adult chronic fish ingestion and drinking water exposure durations to 57 years for adults greater than 21 years of age (21 + 57 = 78 years) for all exposures scenarios, including Tribal exposures. Exposure durations for other lifestages have remained

the same in the final risk evaluation as in the draft evaluation. Since the exposure duration and chronic averaging time are both 57 years instead of 33 years, the exposures did not change from draft to final. No risks were identified for chronic exposures from the fish ingestion and drinking water exposure scenarios for all lifestages and subpopulations.

Aggregate Exposures and Cumulative Risk

Comment 5.1.3

Summary: A public commenter (0069) expressed that EPA failed to evaluate aggregate risks to people exposed to 1,1-dichloroethane from multiple sources and exposure pathways. The commenter discussed the communities of Westlake and Mossville, Louisiana, which are exposed to more than 80 percent of the nation's 1,1-dichloroethane releases. The commenter stated that EPA did not consider the cumulative risks to these communities from co-exposures to 1,1-dichloroethane and other chemicals that cause similar health effects, adding that EPA dismissed these risks based on flawed land use analysis. The commenter further stated that EPA should consider aggregate exposure risks presented to each target organ and the neurological system to address different health outcomes across oral and inhalation studies. The commenter recommended that EPA include drinking water exposures in the aggregate exposure analysis to capture contributions to overall exposures and risks.

The commenter additionally stated that EPA violated TSCA by failing to evaluate the cumulative risks associated with co-exposure to 1,1-dichloroethane and other chemicals that cause similar toxic effects. The commenter added that EPA failed to conduct a comprehensive review to determine which substances have an additive or synergistic interaction with 1,1-dichloroethane.

Relatedly, a public commenter (0068) expressed that EPA must account for cumulative exposures to other chemicals from a variety of sources and pathways. By failing to do so, the commenter stated that EPA ignores the real-world exposures and risks faced by fenceline communities and violates the TSCA mandate to use the best available science. The commenter requested that EPA conduct a cumulative risk assessment for 1,1-dichloroethane, 1,2-dichloroethane, and other chemicals or apply additional adjustment factors to account for cumulative risks.

EPA Response: The impact of co-exposure with other chemicals is outside of the scope of the risk evaluation for 1,1-dichloroethane because EPA applied fit-for-purpose approaches in this risk evaluation. The purpose of this risk evaluation under TSCA is to determine whether 1,1-dichloroethane, a chemical substance, presents an unreasonable risk to human health or the environment under the conditions of use.

EPA discussed aggregation of exposures used to calculate risk from different pathways in Section 5.3.4 of the final risk evaluation. EPA aggregated ambient air concentrations to estimate inhalation risks from co-located facilities. EPA also aggregated oral and dermal risks for the swimming scenario. EPA did not conduct an aggregate exposure analysis across multiple routes in this risk evaluation. Since there are different health outcomes from oral/dermal and inhalation studies, EPA did not consider it possible to aggregate risks across exposure routes for all exposure durations and endpoints for the selected PODs.

Charge Question 8 – Dermal Absorption

Comment 5.1.4

Summary: A public commenter (0062) recommended that EPA use a 0.3 percent dermal absorption factor in the occupational exposure assessments to consider the full range of potential exposures to workers.

A public commenter (0053) expressed agreement with EPA's approach to addressing the *in vitro* dermal absorption study in the risk evaluation. The commenter requested that SACC and EPA consider several key points in the evaluation of the 0.3 percent dermal absorption factor, including: EPA's decision to correct the data for losses of radiolabeled 1,1-dichloroethane is inappropriate; the lack of evidence of correlation between dermal delivery and mass balance in the *in vitro* study; the incorporation of data across multiple experiments rather than only selecting the absorption upper bound; and for the SACC to comment on EPA's choices in disregarding data based on lower recovery to set a precedent for ongoing and upcoming TSCA section 6 reviews.

The commenter additionally recommended that the SACC consider the methodology used by EPA in selecting a screening-level model to estimate dermal exposure potential. Specifically, the commenter requested that the SACC and EPA consider the following points when evaluating the methodology: various governmental and non-governmental agencies as well as peer-reviewed literature support the use of tiered modeling approaches for occupational exposure assessment; the dermal exposure evaluation approach used in the risk evaluation does not include a qualitative exposure evaluation within each condition of use; the exposure frequency assumptions mischaracterize exposure potential for tasks that occur on a less than daily basis; and the dermal load should be variable to account for evaporation and variable skin loading intensity.

In another submission to the docket (0066), the commenter stated that the selected dermal absorption factor of 0.3 percent is inappropriate based on mass balance recovery data. The commenter added that EPA's use of the Dermal Exposure to Volatile Liquids (DEVL) model, a screening-level model, to evaluate dermal exposures differs from the tiered modeling approaches recommended by regulatory bodies, occupational agency guidelines, and peer-reviewed literature. The commenter further stated that the exposure evaluation includes generalized assumptions that all workers across all occupational exposure scenarios experience exposure to 1,1-dichloroethane at the same concentration and frequency. The commenter said that the concentration of 1,1-dichloroethane at its representative facilities ranged up to 10 percent in most process areas, in contrast to EPA's assumed 100 percent 1,1-dichloroethane concentration for dermal exposure scenarios.

A public commenter (0063) requested that EPA use appropriate methods for estimation of dermal occupational exposures. The commenter discussed that the DEVL model and underlying assumptions are inappropriate for estimating dermal exposures to 1,1-dichloroethane for the Manufacturing and Processing as a reactant conditions of use, adding that the provided example dermal exposure scenarios do not match the reality of these conditions of use. The commenter added that the expectation that a worker could completely cover both hands with 1,1-dichloroethane is unrealistic, that the default dermal loading values for the DEVL model have limited applicability, and that 1,1-dichloroethane is highly volatile and virtually unabsorbable under normal conditions.

A public commenter (0065) expressed that not enough clear justification is provided to support the selection of the dermal absorption factor of 0.3 percent when there are data available meeting the acceptance criteria for percent recovery of Organisation for Economic Co-operation and Development

(OECD) 428 and showing lower levels of dermal absorption. The commenter recommended that EPA ensure that the evaluation of data generated from the OECD 428 test method follows international guidelines, justification for the conclusions is provided, and *in vitro* testing be used in tandem with *in silico* tools.

EPA Response: The Test Order submission provided 1,1-dichloroethane dermal absorption data for several different concentrations. For this risk evaluation, dermal absorption is based on the worker exposures relevant to each TSCA COU. In response to the SACC, a dilute exposure scenario (10% 1,1-dichloroethane in 1,2-dichloroethane as the vehicle) was added to the final risk evaluation to estimate dermal exposures for the Waste Disposal OES. EPA continues to use neat (100% 1,1-dichloroethane) form for the dermal assessment for all other COUs as it reflects the appropriate worker exposures in industrial and commercial (laboratory use) settings. Quantitative Test Order data were used for risk calculations. EPA used the IH SkinPerm (*in silico*) model to estimate a dermal fraction absorbed of 1,1-dichloroethane of 0.6 percent for the dilute scenario. For the neat scenario, the fraction absorbed predicted using IH SkinPerm (0.285%) supports the use of the value calculated from the Test Order data (0.3%). EPA did follow OECD guidances mentioned in the Test Order referring to data correction in OECD GD28 and OECD GD156 for missing mass and high data variability.

In response to the comment on the use of a higher-level modeling approach to assess dermal exposure, EPA is utilizing the DEVL model in the final risk evaluation as a probabilistic model as opposed to a deterministic model as presented in the draft risk evaluation. The DEVL is appropriate in estimating occupational exposures of volatile substances such as 1,1-dichloroethane. The model allows for the use of a chemical-specific value for the dermal absorption factor which accounts for the volatility of the chemical and an OES-specific value of the weight fraction of 1,1-dichloroethane. Both test order and IH SkinPerm estimates of fraction of 1,1-dichloroethane absorbed confirm that though the chemical is volatile, it is still absorbable through the skin and thus, a source of exposure in an occupational setting. The skin surface area of two hands is the estimate of an exposure event in which 1,070 cm^2 of skin is exposed to the chemical without the use of gloves as a high-end scenario and 535 cm^2 for central tendency scenario and the corresponding dermal loading of 2.1 mg/cm^2 and 1.4 mg/cm^2, respectively, are applied as cited in U.S. EPA (1992) and one exposure event per day. EPA does not assume constant immersion, rather only assumes one dermal exposure event (applied dose) per work day. The duration of exposure is not defined as a specific duration, it is an assumption built into the fraction absorbed value (0.3%) of the 1,1-dichloroethane loading on the skin. EPA's estimates in the 1,1-dichloroethane risk evaluation are protective of occupational risks from dermal exposures by assuming exposures occur without the use of gloves. In addition, the risk evaluation lists the level of glove use that would mitigate dermal risks.

EPA's practice has been to use this model as a deterministic model by selecting a set of parameter values for the central tendency estimate and a set of parameter values for the high-end estimate. In the final risk evaluation, EPA used the DEVL model as a probabilistic model using a Monte Carlo method. This - allowed for more variation in exposure parameters such as weight fraction of 1,1-dichloroethane, skin surface area exposed, dermal loading onto the skin, frequency of exposure in days/year and number of working years to be incorporated into the dermal exposure assessment (Section 5.1.1.1.5). These parameters were uniformly distributed across a range of values, for example for dermal loading the distribution was between 0.7 and 2.1 mg/cm^2 and for skin surface area the distribution was between 535 to 1,070 cm^2.

Comment 5.1.5

Summary: The SACC discussed occupational exposures for direct users and occupational non-users of 1,1-dichloroethane in the workplace in the context of dermal absorption. The SACC agreed that EPA's methodology involving the DEVL model was an appropriate first step, but recommended supplementing it with "more refined high-tiered models, that may require additional exposure data." Some SACC members expressed that the American Industrial Hygiene Association (AIHA) IH SkinPerm model would yield more reliable results, and the SACC additionally recommended that EPA "consider several other models including its own Stochastic Human Exposure and Dose Simulation (SHEDS)-Multimedia Model and two models developed by the European Union [(EU)]." The SACC suggested that "DEVL be used as a screening tool, with additional models used for higher-tier analyses."

The SACC also expressed that aspects of the risk evaluation, including estimates of the amount of skin exposed and duration of tasks, were conservative. Some SACC members recommended that "EPA take the use of personal protective equipment (PPE) into account when estimating exposure," while other members "disagreed on the grounds that the use of PPE should not be assumed in a risk evaluation, but instead should be specified, if necessary, in a risk management program."

With respect to charge question 8.a, the SACC discussed that EPA studied the rate and extent of absorption following *in vitro* dermal applications at multiple dose levels using multiple potential solvents and dosing scenarios, finding fractional absorption values with a mean of 0.13 percent and standard deviation of 0.05 percent and recovery rates with a mean of 58.42 percent and standard deviation of 7.42 percent. Several SACC members "questioned why EPA opted to focus on 'neat' material rather than 'solutions'" in deriving the fractional absorption value. The SACC also questioned the extent to which losses can be attributed to substance volatilization based on the discussion of results in Labcorp's Final Report (2024).

The SACC provided several additional comments regarding the results of the fractional absorption study used by EPA, including that: EPA's utilization of the OECD Test Guideline 428 Skin Absorption: *In Vitro* Method was appreciated; the Labcorp (2024) recovery rates were significantly below the acceptable ranges for most chemicals and volatile chemicals, as recommended by the OECD Guidance Notes on Dermal Absorption Studies; EPA applied an approach to normalize fractional absorption by the recovery rate, based on an assumption that the missing mass is not absorbable, resulting in a lower adjusted mean fractional absorption of approximately 0.3 percent; and the recovery cutoff of 95 percent cited by EPA does not apply to volatile substances, adding that charcoal traps placed in the donor chamber can help prevent volatile losses. Other comments included that: using a higher fractional absorption value of 0.59 percent calculated from a low recovery rate of 45.82 percent could double the estimated potential dose rate for dermal exposure; not correcting the calculated absorption values for losses "is in disagreement with EPA's calculated [percentage] Absorption according to OECD [Guidance Document] 156 guidance which recommended to address missing mass balance"; the highest recoveries in the Labcorp Early Development (2024) study were observed for non-neat solutions of the test article, with absorption of 0.06 percent; it is unclear why EPA's Existing Chemicals Risk Assessment Division (ECRAD) proposed to use a dermal absorption factor 0.3 percent as the upper bound value in the oral to dermal route to route extrapolation, given that the data used in the factor derivation is outside of the OECD recovery standards; and isopropyl myristate recovery data could be used for determination of dermal absorption factor.

The SACC recommended that EPA "consider dermal absorption data that meet the OECD and [European Food Safety Authority] recovery criteria"; "consider reorganizing and rephrasing Section 5.1.1.1.5 to better justify their choice of numbers"; "consider more clearly explaining the rationale and

justification for choosing the 0.3 percent fractional absorption, supported by quotes or raw data from Labcorp's Final Report and comparisons with other measurements in that report"; and "provide detailed explanations of the calculations for the various numbers mentioned, especially clarifying whether (and how) they were directly derived from Labcorp's raw data or rounded from other figures."

EPA Response: EPA used a higher-level modeling approach for estimating dermal exposure by incorporating a probabilistic approach for the DEVL model in the final risk evaluation compared to the deterministic approach used in the draft risk evaluation.

In response to SACC comments, EPA has modified the Waste disposal OES to also include a scenario where waste could be handled in dilute concentrations of 1,1-dichloroethane. Dermal exposure for this scenario was then modeled to include the dilute weight percent and a corresponding fraction absorbed value for dilute solutions of 1,1-dichloroethane.

EPA has added protection factors (PFs) to the risk estimates tables for mitigation of risks in exceedance of the benchmark for occupational workers. EPA has also added PPE information to the Risk Evaluation based on PPE use reported in the inhalation monitoring Test Order. EPA also applied the dermal protection factors to evaluate exposure and risk reductions that can result from the use of gloves.

In the LabCorp study, concentrations of 1,1-dichloroethane were quantified in all compartments, including the donor chamber, receptor fluid, stratum corneum and in the vapor trap that was used to minimized vapor loss via evaporation. EPA assumed that only a portion of the missing mass is absorbed via the skin. The adjustments EPA applied to the test order data for the neat formulation due to the mass recovery outside the 80 to 120 percent recovery interval for volatile substances, per OECD guidance, were performed to account for potential loss due to volatilization and losses in all compartments. A value of 0.3 percent for dermal absorption was calculated EPA based on this upper 95 percent confidence limit adjustment. EPA carefully considered SACC comments such as to evaluate the IH SkinPerm model and to use lower concentration absorption data for dilute 1,1-dichloroethane scenarios. The IH SkinPerm estimate was calculated to be 0.285 percent absorption, very close to the adjusted value used by EPA in the RE, and accounts for evaporation. Based on concordance between the adjusted Test Order data for dermal absorption and IH SkinPerm, EPA assumes that a portion of the missing mass is absorbed. As per SACC recommendations to use more of the Test Order data, the absorption of 0.06 percent for 10 percent 1,1-dichloroethane in 1,2-dichloroethane as the vehicle is used for waste disposal scenarios for dilute 1,1-dichloroethane COUs as 1,2-dichlorethane is co-constituent within this process. EPA has revised Section 5.1.1.1.5 for clarity.

Comment 5.1.6

Summary: The SACC provided several comments on the methodology and techniques used in the Labcorp Early Development (2024) study , including that: "EPA should consider whether the best scientific methods were applied and whether the most appropriate dosing scenarios were chosen," given that achieving the desired level of recovery should be possible with modern analytical and pipetting techniques; the exposure surface area in a "splash" exposure to neat 1,1-dichloroethane was likely overestimated, likely driving down the dermal absorption factor; and total absorbed radioactivity detected in the receptor fluid and chamber were close to the sensitivity level and may not be reliable. Other comments included that Appendix 11.9 and Table 3-6 include errors in the calculations or description of the mean, standard deviation, and coefficient of variance, and that it is possible that the Labcorp Early Development (2024) study considered dermal absorption by vapor rather than liquid 1,1-dichloroethane.

The SACC recommended "the VITROCELL Skin module system for the analysis of volatile compounds and the exposure of tissue to liquids" as a module that is "a justifiable and superior alternative to Franz cells." The SACC also recommended that EPA "consider that it is possible that the Labcorp study is more relevant to compound dermal absorption by liquid and vapor rather than liquid [1,1-dichloroethane]."

EPA Response: The Labcorp study used the validated OECD 428 method. The limit of detection was very sensitive and reliable at 0.008 percent and the mean raw value was far higher at 0.13 percent. The EPA disagrees that the absorption was due to vapor, the application of 1,1-dichloroethane was as a liquid and not as a vapor, per the study protocol which closely follows OECD 428 dosing at 10 µL/cm^2 for dermal absorption testing.

The dermal absorption testing has been completed and deemed acceptable under the Test Order utilizing the Franz cells; however, in future risk evaluations EPA will consider the suggestion of additional modeling in additional refinement of dermal exposure modeling, if applicable.

Comment 5.1.7

Summary: The SACC provided several comments regarding EPA's assumption that part of the missing mass would be potentially absorbable, including that EPA should consider: "using the unadjusted neat absorption fraction if neat scenarios are expected," otherwise "absorption fractions obtained with higher-recovery diluted solutions could be more appropriate"; that key findings from the published literature, including from Kluxen et al. (2019) "suggests that it is typical for volatile chemicals to assume that losses in the mass balance due to evaporation are expected and not to correct the absorbed fraction"; that "an important caveat of working with a volatile chemical is that it may evaporate after the stock solution has been prepared but before it can be applied to the skin," leading to "an apparent loss of mass balance unless the dosing solution and the application samples are taken at exactly the same time for analysis"; and that "there are conflicting data regarding the effect of dermal loading on the absorption estimates for volatile substances."

The SACC recommended that EPA consider: that "the assumption of 'partial' absorption of the unaccounted mass lacks sufficient justification and likely falls short of a 'robust explanation'"; test groups in Appendix 11.7 of the Labcorp Early Development (2024) study with low fractional absorption estimates below 0.05 percent and recovery rates greater than 90 percent should be deemed "acceptable"; and "whether there is evidence of exposure to neat [1,1-dichloroethane] in working populations," as several SACC members expressed that this exposure scenario is unlikely to reflect real-world conditions and that "the absorption values for non-neat preparations could be more applicable, at least for some [conditions of use]."

EPA Response: Based on OECD and EFSA guidances, EPA adjusted the absorption fraction based on the mass balance. The method of calculating the adjusted absorption is based on the assumption that a portion of the missing mass was absorbed and to account for evaporation across all compartments. The other approaches outlined in the guidances were to assume that either none of the missing mass was absorbed or all of the missing mass was absorbed, which EPA determined would underestimate or overestimate exposure, respectively.

As per the recommendation from the SACC, EPA used the IH SkinPerm model, which resulted in a 0.285 percent absorption factor. This modeled value, which accounts for evaporation, is similar to the Test Order corrected value of 0.3 percent for neat 1,1-dichloroethane, further supporting the application of a mass correction. Based on the evaluation of the identified COUs and on information from industry, EPA determined that the neat concentration was applicable for evaluating most exposure scenarios.

However, as per the SACC recommendation, for the waste handling and disposal COUs EPA used the dermal absorption value from the 10 percent 1,1-dichloroethane formulation. See Section 5.1.1 for the full description of the new approach used for the waste handling and disposal COUs.

Comment 5.1.8

Summary: The SACC also commented on alternative metrics and considerations for assessing the dermal uptake of 1,1-dichloroethane, discussing that several studies have measured or estimated the potential for 1,1-dichloroethane absorption through human skin, with alternative exposure data that can be applied in risk and exposure assessments using existing models or tools. The SACC presented a table of data from the published literature from 2001-2024 and titled, "Summary of available permeability coefficient (Kp) data in units of cm/hour and/or dermal flux rate data." The SACC stated that neither Kp nor flux values directly account for the high volatility and high evaporative flux of 1,1-dichloroethane from skin, and that a model or system that accounts for evaporation will most realistically estimate the potential for uptake. The SACC also discussed that the IH SkinPerm model identified flux values for 1,1-dichloroethane one to two orders of magnitude lower than values determined in Frasch et al. (2007). The SACC added that, in atopic individuals with compromised skin barriers, 1,1-dichloroethane exposure may further disrupt the skin barrier and lead to increased tissue permeability.

The SACC recommended that EPA "consider an alternative approach to estimating the dermal absorption of [1,1-dichloroethane], such as though the use of Kp or dermal flux values, potentially applied using the IH SkinPerm model, or the use of the Labcorp *in vitro* study mixture data for [1,1-dichloroethane], rather than the use of the neat [1,1-dichloroethane] results from the Labcorp study."

EPA Response: As recommended by the SACC, EPA modeled the dermal absorption of 1,1-dichloroethane using IH SkinPerm. The model predicted a dermal absorption of 0.285 percent, which is similar to the value of 0.3 percent calculated from the corrected Test Order data. EPA considered the Test Order Kp values and the lowest value predicted a dermal absorption of 0.8 percent over 8 hours exposure to neat 1,1-dichloroethane. For the final risk evaluation, EPA used a dermal absorption value of 0.3 percent as it was calculated from empirical Test Order data and is supported by the *in-silico* IH SkinPerm model.

Charge Question 10 – Inhalation Exposure Monitoring Data

Comment 5.1.9

Summary: A public commenter (0078) and another public commenter in multiple submissions to the docket (0053, 0066) expressed concern that EPA excluded high quality data from representative facilities provided in response to the 1,1-dichloroethane test order. One commenter (0053) expressed agreement with EPA's requests for review of the occupational exposure assessment approach and for feedback on the use of empirical data from the test order and dermal modeling approaches. The commenter requested the SACC consider the appropriateness of excluding samples reported under the test order from the assessment.

In another submission to the docket, the commenter (0066) further discussed that it collected worker and occupational non-user personal breathing zone samples across four facilities in response to the 1,1-dichloroethane test order to support the occupational inhalation exposure assessments across three occupational exposure scenarios. The commenter requested that EPA provide a rationale for the exclusion of the full data set from the occupational exposure assessment to inform future efforts by companies to collect data in a manner consistent with Agency preferences. The commenter

recommended that EPA provide greater transparency and review its assignment of facilities for each occupational exposure scenario to confirm that data assumptions are reflective of the facilities included in each scenario.

Another public commenter (0078) relatedly expressed concern that excluding data reported under the 1,1-dichloroethane test order will potentially impact risk conclusions made based on central tendency values for the dataset. The commenter added that EPA's current assumptions for the worker exposure estimate do not reflect qualitative information on task frequency and duration.

A public commenter (0063) recommended that EPA incorporate the distribution of monitoring data in its evaluation of occupational exposures and risk and compare the central tendency of the monitoring data against its exposure benchmark. The commenter expressed concern regarding the draft OEV for 1,1-dichloroethane of 44 ppb. Relatedly, another public commenter (0078) expressed concern that the proposed OEVs are orders of magnitude lower than currently enforceable occupational exposure limits.

EPA Response: In response to the comment from commenter 0066, EPA's intent is to use all the 1,1-dichloroethane monitoring data that were received from the test order. As mentioned by EPA during the SACC meeting, some of the 1,1-dichloroethane monitoring data were from sites where 1,1-dichloroethane is produced as a byproduct during the manufacture of 1,2-dichloroeethane. In Scoping, EPA decided that assessment of 1,2-dichloethane byproducts would be included in the 1,2-dichloroethane risk evaluation, so the remainder of the 1,1-dichloroethane test order inhalation monitoring data will be included in the 1,2-dichloroethane RE. EPA used the test order inhalation monitoring data from the site where 1,1-dichloroethane is manufactured as an isolated intermediate in this RE. EPA also applied this same test order data as analogous to the OES of Processing as a reactive intermediate and laboratory chemical. EPA clarified these points clear in Section 5.1.1.1.2 of the final risk evaluation.

As stated in the RE, OSHA recognizes that many of its PEL values are outdated and inadequate for ensuring protection of worker health. The cancer OEV calculation of 44 ppb is based on newer information from a high-quality inhalation study with cancer as the hazard endpoint. For the Final Risk Evaluation, EPA included a description of a modified NIOSH 1003 method capable of detecting below EPA's Occupational Exposure Values. However, EPA notes that the risk-based OEV is not itself a regulatory limit or level, though it can be used to inform risk management. Any proposed occupational exposure limit would be developed as part of risk management rulemaking following the final unreasonable risk determination and would be subject to public notice and comment as part of the rulemaking process.

Comment 5.1.10

Summary: With respect to charge question 10.a, the SACC expressed that the inhalation study by the Vinyl Institute (VI) demonstrated detailed and methodologically sound design and execution, including quality control measures. However, some SACC members suggested that samples collected during emergency conditions should be excluded from analysis for not being representative of routine exposures. The SACC recommended "that EPA contact VI to confirm the conditions under which these samples were collected" and "obtain some information from VI regarding the frequency of this type of release and conduct a sensitivity analysis to determine the impact of excluding exposure data obtained during emergencies or other non-routine conditions." The SACC also recommended that EPA "analyze the distribution of exposures characterized in the test order, if it is more representative of the activities that workers are likely to experience over time."

The SACC discussed the VI study in more detail, commenting that: the personal breathing zone data from Stantec ChemRisk (2023) provided real-world exposure data for reliable risk assessment; the use

of well-characterized SEGs allows for the appropriate determination of exposure variability within a group of workers with similar exposures; some of the SEGs exhibit high variability in the exposure profiles; and the representativeness of high-end estimates should be carefully evaluated. The SACC also expressed that it is unclear how EPA generated additional full-shift samples for the manufacturing condition of use or why EPA focused on the top five highest-concentration samples that contributed to the variability of distribution of exposures, given the random nature of exposure. The SACC suggested that EPA "provide details on how they derived those values differently than what was agreed upon in the test order protocol," "add an explanation for the use or interpretation of such data," and "consider whether a potency adjustment is needed when assessing cumulative exposure and risks associated with exposure to both dichloroethanes in the [1,2-dichloroethane] risk evaluation."

The SACC also expressed agreement with EPA's adoption of SEGs for the manufacturing condition of use to extrapolate data to scenarios not directly sampled but recommended that EPA consider potential problems associated with this approach and "provide additional explanation and justification for its approach," including defining the additional SEGs/occupational exposure scenarios "if exposures are expected to differ based on work practices, exposure controls, or other factors." The SACC commented on other SEGs and conditions of use, stating that: ECRAD's decision to use inhalation data for similar scenarios was methodologically sound, but differences in the volume throughput of 1,1-dichloroethane among conditions of use and different occupational exposure scenarios should be discussed to understand potential exposure impacts; there are no SEGs for the processing uses; the Olin Blue Cube Freeport Facility described in the VI study was identified as manufacturing, but EPA indicated this facility was mapped to the processing as a reactant occupational exposure scenario; if the Olin Blue Cube Freeport facility is "otherwise processing or manufacturing [1,1-dichloroethane], this needs to be stated in the risk evaluation to distinguish it from other processes at this facility pertaining to manufacturing of [1,2-dichloroethane]"; presenting data that may not be used, such as in Table 5-5 in the document "Supplemental File: Supplemental Information on Environmental Release and Occupational Exposure Assessment," is confusing for the public; and the central tendency estimate of the laboratory workers as the central tendency estimate for occupational non-users is likely an overestimate. The SACC also discussed that EPA should "consider at least eliminating the samples identified in the test order as outliers and not representing typical exposures" and "recognize the presence of different SEGs and that exposures of operators are considered the high-end of the distribution of exposures"

The SACC suggested that EPA: "more fully explain [its] decision" to "not include an analysis of [1,1-dichloroethane] as an impurity in [1,2-dichloroethane] manufacturing… given the differences between the two isomers," and use "prior EPA analyses of municipal solid waste landfills." In regard to surrogate inhalation data in waste handling, the SACC generally agreed with EPA's approach but commented that EPA's current analysis of certain key factors may lead to overestimates. The SACC additionally recommended that EPA: "conduct sensitivity analyses to demonstrate how exclusion of data would or would not affect overall summary statistics and exposure estimates for relevant [conditions of use]/SEGs"; "define 'high-end'" and "'emergency' or 'non-routine' data" if excluded; "better clarify how EPA considered or manipulated the data from [the] VI test order," including how EPA generated "full-shift data for the manufacturing [condition of use], beyond the samples reported in the Stantec ChemRisk (2023)"; "clearly identify exposures of concern," "explain why it based its analysis of worst-case exposure on a single facility," and "perform an analysis using all worst-case data and compare the results"; "consider adding a justification or explanation on why the manufacturing data are representative for other [conditions of use] and SEGs"; "consider adding an explanation for the compilation of surrogate monitoring data from other volatile liquids assessed in previous risk evaluations without any correction or accounting for read-across"; and "consider using the central tendency estimate in addition to, the high end estimate for commercial laboratories." The SACC also

recommended that in "future risk evaluations, risk evaluation staff should coordinate with risk managers, to discuss how SEGs will be used to inform risk management."

EPA Response: For the final risk evaluation, EPA created an additional SEG for the two data points described as responding to emergency situations. EPA also recalculated the exposure for production operators with these two data points removed.

EPA agrees that the data from the test order are high-quality, and this was reflected in the use of the data in the risk evaluation. EPA also agrees in presenting exposures according to SEGs and aims to do this whenever there are sufficient metadata, as was available in the Test Order Data Summary Report. EPA's purpose in presenting details on the five data points was to help the reader better understand how exposures can occur and to make full use of the data that was available in the Test Order Data Summary Report. EPA provided additional clarification in Section 5.1.1.1.2.

EPA appreciates the positive feedback on the approach it followed with regards to the use of SEGs and applying test data for manufacture to other similar OES. EPA agrees that it is important to discuss uncertainties in making this application to other OES and has provided additional clarification in the final risk evaluation (Section 5.1.1.1.3). EPA clarified the OES for the Olin Blue Cube site and removed any data that were not used in the analysis from the supplemental engineering report. As previously mentioned, EPA included an SEG for the data points characterized as responding to emergency conditions.

EPA has edited Section 5.1.1.1 to explain that an EPA decision was made during scoping to assess the OES of 1,1-dichloroethane produced as a byproduct during the manufacturing of 1,2-dichloroethane in the 1,2-dichloroethane risk evaluation.

Comment 5.1.11

Summary: With respect to charge question 10.b, the SACC provided several comments including that: EPA's use of surrogate chlorinated solvent inhalation monitoring data to estimate occupational exposures in the General Waste Handling, Treatment, and Disposal occupational exposure scenario is a scientifically grounded approach; the use of surrogate data allows for continued progress in risk evaluation without the need for extensive new data collection but cannot fully account for all variables; the exclusion of data from sites where 1,1-dichloroethane is an impurity could underestimate the full range of exposures workers might face; EPA's application of a vapor pressure correction factor to account for differences between 1,1-dichloroethane and surrogate chemicals is critical in limiting the uncertainty of the surrogate data; and it is counter-intuitive that predicted exposures in the waste-handling operations for small releases of 1,1-dichloroethane are 10-fold greater than the high-end exposures measured in the manufacturing operation. The SACC additionally discussed that: it is important to consider the representativeness of workplace conditions; potential exposures to 1,1-dichloroethane are expected to be much lower than those predicted for methylene chloride; "EPA should justify how representative these [waste-handling operations] are for [publicly owned treatment works] workers"; and it is expected that laboratories at manufacturing sites are likely to be representative.

The SACC additionally discussed manufacturing data, including that: "EPA should describe clearly in the text that the exposures in the manufacturing site are expected to be greater; and therefore, be considered a high-end estimate of mean exposures through the value chain"; additional qualitative analysis is needed for waste handling; "EPA should reconsider whether the waste handling occupational exposure scenario is already at least partially captured by the available datasets for [1,1-dichloroethane]"; "EPA should more closely evaluate potential differences in the exposure potential associated with handling methylene chloride wastes relative to [1,1-dichloroethane] wastes"; "EPA

should consider [estimated exposures during processing and repacking] as bounding estimates, rather than plausible estimates of the exposure"; "EPA should refine the scenarios that seem to present unreasonable risk " using the tiered approach; and "EPA should consider whether it needs to separately evaluate the general disposal [occupational exposure scenario]" given potential overlap with the operator/processor and maintenance technician scenarios.

The SACC recommended that EPA: "use chemical similarity to select appropriate surrogate chemicals for exposure estimation"; "implement vapor pressure correction factors to enhance the accuracy of exposure estimates"; "assess the representativeness of occupational environments where surrogates are applied"; "consider workplace factors such as isolation, ventilation, other engineering controls, work practices, chemical use frequency, protective equipment in exposure assessments"; "apply safety margins or uncertainty factors to account for variability and differences in exposure scenarios"; "explore the empirical assignment of correction factors based on chemical similarity and activity, as suggested by Franken et al. (2020)"; and "address the exclusion of relevant sites and processes in exposure assessments to capture a more comprehensive range of worker exposures."

EPA Response: EPA emphasizes that all the test order inhalation monitoring data will be used in either the risk evaluation for 1,1-dichloroethane or 1,2-dichloroethane. The data on exposure to 1,1-dichloroethane produced as a byproduct in 1,2-dichloroethane manufacture will be used in the 1,2-dichloroethane risk evaluation. EPA agrees with the comment on use of a vapor pressure correction factor in its use of surrogate data and that was a part of the method EPA used.

The comments provide an opinion comparing the exposure estimates for waste disposal with the test order inhalation monitoring data for 1,1-dichloroethane. EPA does agree that there is uncertainty in the waste disposal assessment which hinders making comparisons with the test order data. The comments also include an opinion that exposures to 1,1-dichloroethane in waste disposal are expected to be much lower than methylene chloride. EPA recognizes that the use of surrogate monitoring data to assess a worker's daily exposure level for a chemical does introduce more uncertainty that using chemical-specific monitoring data. This is reflected in the weight of scientific evidence confidence rating which EPA rated as slight. Methylene chloride does have a higher vapor pressure than 1,1-dichloroethane but EPA did apply a vapor pressure correction factor to the methylene chloride data in estimating exposure to 1,1-dichloroethane.

EPA agrees that there is uncertainty in the assessment of exposures during waste disposal and this impacts the ability to differentiate exposure potential among different waste disposal scenarios such as POTWs.

There is a comment that EPA should consider exposures during manufacture to be greater than other exposures in the value chain. EPA does not feel that there is a sufficient basis to make that statement. EPA's practice in risk evaluations has been to apply inhalation monitoring data for the Manufacture OES to the Processing as a reactive intermediate OES if there are no monitoring data. Both of these OESs tend to be large-scale, continuous processes that run throughout the year with similar process steps, equipment and controls and may involve the same sites. EPA also made a judgment that the data for the laboratory technicians at the manufacturing facility could be used in the assessment of the laboratory chemical OES. Application of the test order data beyond that is limited due to the data being from one site and uncertainty that the controls used at the site that impacted the exposure levels found would be the same and have similar effect on the exposure levels for other OESs and unknown sites.

There is a comment that EPA should more clearly evaluate differences between 1,1-dichloroethane waste handling and methylene chloride waste handling. EPA agrees that performing that evaluation would be optimal but has found data to make that evaluation to be lacking.

There is a comment that EPA should consider the exposure estimates from repackaging to be bounding estimates. EPA agrees that there is uncertainty in the assessment of repackaging exposures which impacts the ability to compare the results for repackaging with the results of the monitoring study done for manufacturing.

EPA did not find any inhalation monitoring data for 1,1-dichloroethane from the systematic review to estimate inhalation exposures for the repackaging OES. EPA does have a generic scenario for repackaging and the scenario recommends the use of mass balance models to estimate inhalation exposure. The generic scenario recommended approach was used to estimate inhalation exposures to 1,1-dichloroethane for this OES. A strength of the assessment was the use of probabilistic modeling using Monte Carlo for the mass balance models. This allowed modeling of the ranges in values of model parameters in estimating the 50^{th} percentile and 95^{th} percentile inhalation exposures.

EPA used a modeling approach for the repackaging OES as specific information on 1,1-dichloroethane were not available. Due to a lack of information on production volume and how 1,1-dichloroethane is handled and repackaged, EPA used default values for the model, thus potentially over- estimating exposures, especially for activities that handle a small portion of the manufactured volume. The OES for repackaging was based on an EPA assumption that a repackaging step would need to take place prior to the use of 1,1-dichloroethane as a laboratory chemical. There were two manufacturing sites identified which manufacture 1,1-dichloroethane, which EPA assumed also conduct repackaging activities. Repackaging, however, may also occur at the 12 sites which process 1,1-dichloroethane. For modeling purposes, EPA used 2 sites which equates to 25,000 lbs/site/yr. EPA then used a Monte Carlo modeling approach which included varying the parameters such as container size to generate a distribution of estimates for exposure days and exposure concentrations to 1,1-dichloroethane. The parameters of lbs/yr for repackaging, number of sites and the daily amount handled are foundational parameters in the modeling approach that impact the daily exposure levels. The lack of 1,1-dichloroethane supporting information for lbs/yr for these parameters is a major uncertainty in the assessment of this OES and EPA therefore assigned a slight confidence rating for this OES. The SACC panel agreed that this OES is uncertain, and estimates should be considered as bounding estimates. In addition, estimates potentially overestimate exposure as repackaging activities in the manufacturing site would handle lower volumes with less frequency than the manufacturing operations.

EPA did not find any inhalation monitoring data for 1,1-dichloroethane from the systematic review of the scientific literature to estimate inhalation exposures for the waste handling, treatment, and disposal OES. EPA does not currently have a generic scenario for this OES to provide a characterization of exposure. To estimate inhalation exposure, EPA used surrogate monitoring data for chemicals with similar physical-chemical properties to estimate inhalation exposures to 1,1-dichlorethane for these OESs. For POTWs, there is uncertainty regarding whether the surrogate chemical volume throughput and concentrations, worker exposures, and waste streams are sufficiently similar to those for 1,1-dichloroethane. EPA's method for using surrogate data includes the application of a vapor pressure correction method based on assumption that Raoult's law is valid, to account for vapor pressure differences between the chemicals that were monitored and 1,1-dichloroethane. The metadata for the surrogate monitoring data used were limited. For example, the data did not include detail on the exposure groups that were monitored. This limits EPA's ability to understand exposure potential according to different exposure groups and tasks at facilities that handle, treat and dispose of waste. Additionally, most facilities generating or using 1,1-dichloroethane are using it in processes in which it is either consumed as part of a reaction or generated as an impurity, resulting in low concentrations of 1,1-dichloroethane expected to be present in the waste streams. There is also, as stated by the SACC, uncertainty in whether the general disposal OES may be covered in the operator/processor and

maintenance technician OESs. Because 1,1-dichloroethane specific information (e.g., inhalation monitoring data) on this OES is not available and a generic modeling scenario was also not available, EPA's confidence in this assessment is slight (see Table 5-18 of the Risk Evaluation).

Charge question 10 – Dermal Exposure Modeling

Comment 5.1.12

Summary: With respect to charge question 10.c.i, the SACC provided several comments including that: EPA's justification for normalizing the study data by the losses to select the absorption value provides a conservative estimate that recognizes the limitations of the other proposed approaches; it may be more appropriate to use the Labcorp Early Development (2024) *in vitro* dermal absorption data than the IH SkinPerm model if dermal exposure and risk to mixtures are added to the risk evaluation; and using dermal loading values based in a generic scenario for oils might yield a conservative estimate of the predicted exposure. The SACC presented a table entitled "Comparison of Physical Properties of 1,1-Dichloroethane, 1,2-Dichloroethane, Ethanol, Water, and Selected Oils," and discussed that: it is not logical to use dermal loading from water systems given 1,1-dichloroethane's chemical properties; the estimated surface of skin exposed in the high-end estimate may be overly conservative; using the same predicted dermal exposure for all activities through the value chain should be reconsidered if unreasonable risk is suspected; EPA's use of the DEVL model is an important in addressing potential occupational risks, but DEVL is considered a low-tier model that tends to overestimate dermal exposure; the application of the dermal loading values currently used in the DEVL model presents are based on constant loading assumptions that may not reflect the variable nature of exposure to volatile chemicals; EPA should perform "additional analyses… to determine whether the percent absorbed value from the specific conditions in the *in vitro* absorption study are appropriately relevant" to the approach using the DEVL model. Additionally, the SACC commented that: "EPA should consider working with stakeholders to collect SEG-specific data on actual dermal loading"; EPA's current absorption factors are an overly simplistic representation of dermal exposure risks; EPA should "either revise various assumptions in the DEVL calculations, or consider a different dermal modeling method"; the method for correcting evaporation in the DEVL model is not clearly explained; "EPA could move to a flux-based approach"; *in vitro* skin models could support developing a comprehensive database for volatile materials; and there are conflicting data describing dermal loading effects on absorption estimates for volatile substances. Some SACC members also stated that "collecting real world data would be a better use of limited resources," and one SACC member recommended caution in interpreting the Aggarwal et al. (2015) results.

The SACC recommended that EPA: "revisit, and if necessary, revise the assumptions in the DEVL model"; "consider using an alternative model, such as IH SkinPerm, for comparison to, or instead of the DEVL model"; "reassess oil-based dermal loading estimates, which do not reflect the volatility of [1,1-dichloroethane] and are likely to be overestimates"; and "adjust the fraction absorbed estimates (f abs) to account for evaporation, possibly by using a dynamic loading approach such as the AIHA's Mathematical Models for Estimating Occupational Exposure to Chemicals (AIHA, 2009)."

EPA Response: EPA used the DEVL model to estimate dermal exposure and used data from the test order to estimate the fractional absorption parameter, which is one of the DEVL model parameters. EPA's application of the DEVL model includes assumptions of 1 contact per day and that the exposure frequency in days per year is equal to the number of days the task is performed. Some tasks in occupational settings occur daily. The amount of skin surface area potentially exposed to hands or other parts of the body is equal to

the surface area of 1 to 2 hands, that is 535 cm^2 for central tendency scenario and 1,070 cm^2 for the high-end, conservative scenario. The loading onto the skin is derived from data as cited in U.S. EPA (1992). EPA does not assume a constant loading, as would be represented by a flux parameter and a scenario where the chemical loading is not depleted, rather for the 1,1-dichloroethane occupational assessment, the fraction absorbed is the fraction depleting the 1,1-dichloroethane chemical load (1.4 mg/cm^2 or 2.1 mg/cm^2 representing central tendency and high-end dermal loading, respectively), by dermal absorption as well as volatilization.

EPA agrees that data on dermal loading values are needed and ideally sufficient data to better discern potential differences between the level of dermal exposure between OES and different exposure groups within OES. The DEVL model does include the measured chemical-specific parameter of fraction absorbed from a test order study which accounts for the volatility of the chemical and the OES-specific parameter of weight fraction.

EPA's preference is to use data for fraction absorbed rather than a model, because use of chemical-specific measured data reduces uncertainty EPA did run IH SkinPerm as well to estimate 1,1-dichloroethane fraction absorbed for comparison to the test order data. IH SkinPerm is an Excel application for estimating dermal absorption. The IH SkinPerm estimate (0.285%) supported the EPA 1,1-dichloroethane test order fraction absorbed data (adjusted value: 0.3%) providing confidence in EPA's dermal assessment.

Comment 5.1.13

Summary: With respect to charge question 10.c.ii, the SACC expressed that the use of a tiered approach for occupational dermal exposure assessment in risk evaluations that emphasizes qualitative data collection, integration of field data, and thoughtful consideration of factors can be efficient. The SACC provided a comparison of different models, including the: DEVL model, a screening tool; IH SkinPerm, which provides semiquantitative estimates of absorption; "Two-Zone Model" (Nicas, 2009), suggested by some SACC members and can incorporate variable evaporation rates and real-world exposure data for volatile chemicals; the European Centre for Ecotoxicology and Toxicology of Chemicals Targeted Risk Assessment (ECETOC TRA), which is widely used in regulatory frameworks under the EU's Registration, Evaluation, Authorisation and Restriction of Chemicals regulation; EPA's SHEDS-Multimedia Model, which can be applied to assess dermal exposure to volatile chemicals in environmental and occupational settings; and EU's Risk Assessment of Occupational Dermal Exposure to Chemicals, specifically designed for assessing occupational dermal exposure. The SACC suggested that a future approach could be to apply *in vitro* skin models "to develop a comprehensive database for volatile materials," but that "actual dermal sampling under real-world conditions would be an even better approach, when circumstances permit it."

The SACC recommended that EPA: "consider tiering the dermal exposure assessment for [1,1-dichloroethane] and other chemicals moving forward, restricting DEVL to use as a screening method"; consider IH SkinPerm as a higher-tier model for the risk evaluation; and consider using the ECETOC TRA tool, which "integrates specific parameters for volatility," accounts for "the chemical's tendency to evaporate rapidly," "refines exposure estimates by considering the different occupational settings and frequency of skin contact across various industries," and "offers a customized approach for worker exposure assessment by accounting for fugacity and the balance between evaporation and skin absorption."

EPA Response: EPA used the DEVL model to estimate dermal exposure. The model includes a chemical-specific parameter in fractional absorption which is based on chemical-specific test data and includes 1,1-dichloroethane volatility. EPA used the IH SkinPerm model for comparison. In the specific

case of 1,1-dichloroethane, this parameter helps to account for the high volatility of 1,1-dichloroethane in estimating the dermal dose. The DEVL model includes an OES specific parameter in the weight percent of 1,1-dichloroethane during the activities of the OES.

EPA made several refinements to the dermal assessment approach as a result of discussion at the SACC meeting. EPA ran the DEVL model as a probabilistic model using Monte Carlo to better consider the variation in the values of key parameters such as skin surface area and dermal loading onto the skin. EPA also considered a scenario for the Waste disposal OES where the waste could contain dilute concentrations of 1,1-dichloroethane and ran the DEVL model for this scenario using the dilute weight percent and a fraction absorbed value from the test order data.

The DEVL model estimates dermal exposure without consideration of the use of personal protective equipment. The Test Order provided data on glove use at the facilities that were monitored. For the final Risk Evaluation, EPA has included consideration of the use of PPE on the exposure and risks from dermal exposure.

For Risk Evaluations, EPA modified the Dermal Exposure to Liquids model that is part of ChemSTEER and used in New Chemicals assessments to include the fraction absorbed parameter to refine the estimates of dermal exposure for volatile liquids. EPA agrees that further refinement of dermal exposure assessment approaches is needed and favors efforts to collect data on dermal exposure in occupational settings.

Other Comments

Comment 5.1.14

Summary: The SACC recommended the following editorial changes to the draft risk evaluation:

- Lines 4962-4964: It would be helpful to know where in the document to find the information, rather than simply citing more than 200 pages of text.
- Line 4982, Table 5-4: The [time-weighted average (TWA)] column lacks units.

The SACC recommended the following editorial changes to the Supplemental Information file:

- "The current selection of high-end values seems to underrepresent high-concentration potential. Using only three to five data points does not adequately represent the upper bound at the 95th percentile. For five data points, a 95th-centile value would be the sum of the mean and the standard deviation multiplied by 2.132. For two data points, the t-value needed in the pervious equation is 6.314. The upper limit would be the vapor pressure of 1,1-dichloroethane at the temperature of the operations being considered on a given day.
- Line 1072: Removal of data that are below detection is problematic and may not protect human health. If detection limits are high, such elimination can mask potential exposures. Failure to have adequate chemical inventory is not a reason to assume no exposure.
- Lines 1083-1086: These multi-sample scenarios per individual could allow refinement of exposures for workers who are exposed to 1,1-dichloroethane in shorter intervals.
- Line 1091: Activities 'my' cause should be activities 'may' cause.
- Lines 1353-1354: Was only one facility tested? Was the data request for that facility alone or was that single site selected by the regulated community?
- Lines 1358-1360: Were the same techniques used for estimating 95th centile upper bound? If so, there are ample data to estimate a 95th centile rather than selecting the highest observation.

- Table 5.3 needs to list N values for each task, or Table 5.4 needs to have a row for occupational non-users where N can be included. Are the sample numbers in Table 5.4 in fact the numbers for Table 5.3?
- Also in Table 5.3, the acute high-end exposure is lower than the 8-hr TWA. It is difficult to envision this being a likely scenario. Were geometric means used and distributions about those means or was the highest measured concentration used for the higher end value? The highest measured value is only likely to be an actual high-end value (90th-95th centile) of the distribution if there are sufficient data (likely 20 or more data points). This concern seems to be verified in the data produced from the Stantec ChemRisk (2023) inhalation study. Better definition is needed to explain what is mean by 95th centile exposure. In the current EPA draft risk evaluation and in the Stantec document, a 95th percentile confidence interval of the mean is reported as the 95th percentile exposure, which is technically incorrect."

EPA Response: EPA incorporated editorial comments into both the 1,1-dichloroethaneethane final risk evaluation document and the supplemental report.

Regarding the comment on removal of data below the detection limit – this statement was in a methodology section that described specific procedures for treatment of data from the OSHA CEHD database. EPA did not identify data for 1,1-dichloroethane from the OSHA CEHD so this procedure was not applied in the 1,1-dichloroethane Risk Evaluation.

The EPA test order process includes steps for reviewing the proposed inhalation monitoring plan. EPA provides comments and an iterative process is followed to achieve an approved study plan. Selection of sites to monitor is an important part of the study plan. The approved study plan included monitoring at four different facilities. One of the facilities produces 1,1-dichloroethane as an isolated intermediate. These data were used in this risk evaluation. The other three facilities manufacture 1,1-dichloroethane as a byproduct in the manufacture of 1,2-dichloroethane. These data will be used in the 1,2-dichloroethane Risk Evaluation.

Regarding the comment on the acute high-end exposure being lower than the 8-hr TWA: EPA's practice is to estimate the central tendency and high-end exposures as 8-hr TWA exposures. The acute concentrations for both central tendency and high-end values are then estimated from the 8-hr TWA exposures by the equations in Section 5.3.3.1.1. In Section 5.3.3.1, Table 5-50 also includes the default values of exposure duration (ED), breathing rate ratio (BR) and acute averaging time which are parameters in the equation used to calculate acute concentration.

Section 5.2 – Human Health Hazard Assessment

Comments associated with this issue are summarized in the subsections below.

Charge Question 3 – Read-Across Analysis for Human Health Assessment

Read-across approach and methodologies

Comment 5.2.1

Summary: A public commenter (0052) stated that charge question 3 should include whether EPA has sufficiently considered the relative potencies of the dose-response relationships, given differences in metabolism and rates of metabolism for mammalian toxicity.

The commenter additionally discussed (Sharpe and Carter, 1993), stating that EPA does not cite this study even though it includes findings related to the aldehyde dehydrogenase 2 (ALDH2) gene. The commenter recommended that the SACC consider the appropriateness of the ALDH2 mutation as a PESS for 1,1-dichloroethane given this research.

Another public commenter (0053) expressed agreement with EPA's approach to the read-across analysis for the human health assessment but recommended that the SACC give attention to the reproducibility of EPA's methodology. The commenter suggested that the read-across approach could be strengthened by incorporating recommendations the European Chemicals Agency Read-across Assessment Framework and works by the EPA Center for Computational Exposure.

The SACC stressed the importance of identifying analogues to understand toxicity. The SACC said that the similarity between target chemicals and potential analogues should be evaluated based on physical/chemical properties, reactivity, and metabolism compared to the target chemical. The SACC applauded the initial steps taken in the read-across approach, however found that certain metabolic differences between 1,1-dichloroethane and 1,2-dichloroethane may have been overlooked, as 1,2-dichloroethane forms more reactive metabolites. Some SACC members agreed that 1,2-dichloroethane has reliable toxicity data and thus may be an acceptable worst-case analog. The SACC said that the Hoffman et. al 1971 study found 1,2-dichloroethane to be approximately five times more toxic than 1,1-dichloroethane under the study conditions. In regard to the Hoffman et al. 1971 finding, the SACC said:

- "This finding has important implications for the draft risk evaluation and must be acknowledged. Additionally, a thorough discussion of potential uncertainties related to read-across should be included, as these could lead to over- and/or underestimation of risk."

The SACC made the following recommendations to improve that metabolism assessment between 1,1-dichloroethane and target chemicals:

- "Adhere to the read-across selection procedure as detailed in Lizarraga et al. (2019). There is a more recent publication, Lizarraga et al. (2023) that, if more appropriate, should be added.
- If after reconsideration [1,2-dichloroethane] is chosen by EPA as an analog for [1,1-dichloroethane], the difference in potency should be taken into consideration in the Risk Evaluation.
- Consider employing a category approach (multiple analogues) for the risk evaluation of [1,1-dichloroethane] to minimize uncertainties.
- A discussion of the potential uncertainties of read-across in general should be developed and included in this evaluation."

The SACC found that EPA likely did not adhere to the comprehensive analogue identification procedure outline in Lizarraga et al. (2019), and therefore one or more suitable analogues to 1,1-dichloroethane were prematurely dismissed. The SACC said that EPA failed to analyze metabolic and toxicological similarities and provide sufficient justification.

The SACC found that the read-across framework presented in Lizarraga et al. (2023) and based on the principles and approach from Wang et al. (2012), match the approach taken and described in the draft risk evaluation.

EPA Response: Relative potencies cannot be considered because of the lack of data for 1,1-dichloroethane and hence the need to read-across to fill in those data gaps. While the Hofmann et al. (1971) study is described in the hazard identification, EPA determined that it did not contain enough

data to calculate a relative potency factor. Additional consideration of the Hofmann et al. (1971) study is included in Section 5.2.6 of the Risk Evaluation.

EPA considered the ALDH2 polymorphism (mutation) as a PESS in the Risk Evaluation in Section 5.3.2. The Sharpe and Carter (1993) paper was captured as part of our systematic review process and incorporated into the final risk evaluation. The Sharpe and Carter (1993) study indicated that the chloroaldehyde from 1,1-dichloroethane is cleared much more slowly by mitochondrial aldehyde dehydrogenase-2 than the chloroaldehyde from 1,2-dichloroethane, supporting the concern that individuals with the ALDH2 polymorphism may be of greater susceptibility to 1,1-dichloroethane exposure as it has the potential to remain in tissue longer to elicit effects before being eliminated and is thus a relevant and appropriate consideration. Additional references, such as Cheever (1990) as recommended by the SACC, were incorporated into the final risk evaluation in support the PESS analysis.

EPA added additional language to the final risk evaluation describing the read-across methodology in further detail with each of the steps outlined in Sections 5.2.1.3 in the Risk Evaluation. Specifically, metabolic toxicological similarities were considered in Section 5.2.1.3.3 of the Risk Evaluation. In the draft risk evaluation, EPA used the read-across method described in Lizarraga et al. (2019). In response to the SACC, EPA incorporated refinements to the read-across method in accordance with Lizarraga et al. (2023). The read-across method described in the Lizarraga et al. (2023) has been incorporated within the read-across narrative in support of the 2019 paper. The proposal from the SACC that 1,2-dichloroethane is a "worse-case" analog further supports the stance by EPA that the use of the toxicological evidence and hazard data from 1,2-dichlorethane would be human health protective when deriving risk estimates.

Selection of 1,2-Dichloroethane as the Analog

Comment 5.2.2

Summary: A public commenter (0068) stated that EPA's selection of 1,2-dichloroethane as an analog for the toxicity of 1,1-dichloroethane is well-supported by the Agency's analysis.

In contrast, a public commenter (0053) recommended that the SACC consider the overall choice of 1,2-dichloroethane as an appropriate analog for 1,1-dichloroethane. In particular, the commenter suggested that: greater transparency and specifics in the use of tools to identify 1,1-dichloroethane analogs is needed to fully evaluate EPA's methods; some potentially useful analogs like dichloromethane were excluded without clear explanation; the analog selection process lacked clarity; EPA should use a category approach for every human health endpoint; hazard data indicates that 1,2-dichloroethane may not be an appropriate analog for all endpoints; and the SACC should provide feedback on the selection process and the impact of using only 1,2-dichloroethane analog data instead of existing 1,1-dichloroethane studies.

In another submission to the docket (0066), the commenter stated that one of the key components of the 1,1-dichloroethane draft risk evaluation is the identification and use of 1,2-dichloroethane as an analog, but that both empirical data and computational modeling suggest different toxicities for several endpoints for these chemicals. The commenter discussed EPA's use of the AIM tool, the OECD quantitative structure-activity relationship toolbox, the Generalized Read-Across tool, and the Cheminformatics Search Module, adding that EPA used appropriate tools to identify the eight candidate analogs but that greater transparency in the use of these tools is needed to evaluate EPA's selection methodology. The commenter stated that it was unclear how many analogs were identified using each

tool and which options, settings, or filters were selected. Regarding the AIM tool, the commenter stated its use was "questionable" given that the software has not been updated since 2012 and does not provide quantitative information on structural similarity.

The SACC said that in Section J.2.1, Structural Similarity, EPA failed to define the term "additional lines of evidence" when defending 1,2-dichloroethane as the best possible analogue to 1,1-dichloroethane. The potential trichloro and other analogues were dismissed without adequate justification, and EPA failed to describe the metabolic and toxicity similarities in the write up. The SACC agreed that these details must be included in order to defend 1,2-dichloroethane as the best possible analog to 1,1-dichloroethane.

The SACC raised concerns about the AIM software methodology in determining suitable structural analogs. The SACC said that there was no explanation in what differentiated a 1st pass analog from a 2nd pass analog, and the rationale behind the dismissal of other first pass analogs was missing. Following a correspondence with EPA about the functionality of the AIM tool, the SACC found that "given that AIM has not been updated or supported for 12 years and EPA itself recommends using GenRA a tool also utilized in the selection process for the analog in addition to AIM the SACC questions the appropriateness of relying on AIM."

Additionally, the SACC recommended that EPA do the following:

- "Provide a clear justification for the appropriateness of using AIM and Cheminformatics Modules. The information below from lines 13588-13591 should be supported with justification for the choice of the methods.
- Utilize additional software tools to enhance the identification of potential analogs. As recommended above (charge question 3a) consider employing a category approach (multiple analogues), for the risk evaluation of 1,1-dichloroethane to minimize uncertainties."

Additionally, the SACC found that there were extra words in the sentence on lines 13754-13757. The endpoints identified for 1,1-dichloroethane and 1,2-dichloroethane were from studies that passed the OPPT Systematic Review, however the endpoints were not robust enough to identify non-cancer points of departure (PODs) or cancer slope factors for the quantitative risk estimates.

EPA Response: EPA does not have a TSCA chemical category for chlorinated solvents. During prioritization, the chemical was selected as a distinct chemical for risk evaluation. There were inadequate toxicologic data for 1,1-dichloroethane, therefore read-across was necessary. The overall selection of 1,2-dichloroethane as an analog for 1,1-dichloroethane was based on structural and physical and chemical properties for ADME and reliable toxicology data availability. More details, including justification of the read-across tools, were incorporated into the read-across narrative for clarity (Sections 4.2.1.1 and 5.2.1.3). Tools used were those that were publicly available for transparency. EPA provided additional language for clarity and to better describe the analog analysis and approach used for the 1,1-dichlorethane risk evaluation in (Section 5.2.1.3).

EPA's use of the AIM tool, the OECD toolbox, the Generalized Read-Across tool, and the Cheminformatics Search Module was further described in Section 4.2.1.1.1 and in Table 4-1 of the risk evaluation to provide transparency in the use of these tools and the methodology applied with regard to the filtering criteria for each tool and which options, settings, or filters were selected.

EPA used a weight of scientific evidence across multiple read-across tools to identify the most appropriate analog based on the considerations identified above.

As stated in 4.2.1.1.1, EPA's TSCA New Chemicals Program utilizes the Confidential Business Information (CBI) version of AIM to identify analogs with data (including analogs with CBI, however no analogs with CBI were included in the environmental or human health hazard analog selection for 1,1-dichloroethane). Analogs with CBI are not found in the public-facing version of AIM in order to protect business confidentiality, and CBI-AIM has undergone updates not found in the public-facing version of AIM with the latest applied to the non-CBI-AIM platform in 2012 and CBI-AIM update in 2016 in relation to data sources from other EPA programs. Therefore CBI-AIM can provide a more robust list of analogs, including analogs without CBI. However, while a CBI version of AIM was used, no CBI analogs were found in the analog selection for 1,1-dichloroethane that differed when compared to those found in the non-CBI version of the AIM tool. Additionally, AIM was used as an initial screening tool for analog identification that was complemented by the additional tools outlined in the analog selection framework as describe in Section 4.2.1.1 of the Risk Evaluation. As AIM is a tiered set of search approaches for identifying analogs based on measured data, a 1st and 2nd pass was applied to the search criteria. A 1st pass is an initial more stringent search criteria in which chemicals are selected when all fragments and atoms in the query chemical are contained in the analog identified (1:1 match) and is the default search if no additional pass is applied. During the 2nd pass, many of the larger molecular fragments identified in the 1st pass which specify the orientation of the atoms are not part of this search and are more inclusive of additional analog candidates.

The Cheminformatics Modules were used to for analog identification based on structural similarity by comparing Tanimoto scores. Section 4.2.1.1.1 and in Table 4-1 of the risk evaluation provide the search criteria and results in the analog identification applied to the Cheminformatics Modules.

EPA fixed the typo referenced by the SACC on lines 13754-13757.

Comment 5.2.3

Summary: In regard to kidney toxicity, a public commenter (0066) reviewed specific values available for 1,1-dichloroethane and 1,2-dichloroethane in the CompTox Chemicals Dashboard and determined that 1,1-dichloroethane was less potent than 1,2-dichloroethane in inducing kidney toxicity. The commenter added that previously established provisional peer reviewed toxicity values under EPA's Office of Research and Development (ORD) Superfund program indicates that EPA previously understood the potencies of these two substances to be different in both sub-chronic and chronic scenarios. The commenter stated that EPA does not fully address this in its proposal of 1,2-dichloroethane as an analog for this POD.

The commenter additionally discussed the Agency for Toxic Substances and Disease Registry (ATSDR, 2024) review of several studies on kidney toxicity for 1,2-dichloroethane, and stated the clear consistency of findings of the kidney as a potential target for toxicity of 1,2-dichloroethane contrasts the inconsistent findings for 1,1-dichloroethane. The commenter also conducted computational modeling using Lhasa Derek Nexus (v2.2), which supported the findings that 1,2-dichloroethane may not be an appropriate analog for assessing kidney toxicity of 1,1-dichloroethane.

In regard to immunotoxicity, the commenter discussed several 1,2-dichloroethane animal studies summarized by ATSDR (2024). The studies found limited to no immunological effects in mice, rats, rabbit, or guinea pigs exposed to 1,2-dichloroethane via inhalation, and limited to no effects in mice or rats exposed via oral pathways. The commenter also conducted computational modeling using Lhasa Derek Nexus (v2.2) and did not find alerts for cumulative effect on white count and immunology or splenotoxicity for either 1,1- or 1,2-dichloroethane.

In regard to reproductive toxicity, the commenter discussed reproductive studies summarized by ATSDR (2024) for animals exposed to 1,2-dichloroethane via inhalation, including Zhang et al. (2017), three inhalation studies deemed to have "questionable reliability" by ATSDR, and Rao et al. (1980). The commenter added that for several oral studies in rats and mice, either no histological changes in male and female reproductive tissues or no effects on fertility in female rats were observed. The commenter conducted computational modeling using Lhasa Derek Nexus (v2.2), finding no alerts.

The commenter stated that that 1,2-dichloroethane may not be an appropriate analog when considering potential potency of effect, kidney toxicity, and carcinogenicity, and differences in metabolic pathways and metabolite production. The commenter further suggested that EPA: reconduct its read-across analysis, incorporating recommendations from additional sources on read-across approaches, to improve analog identification; consider use of a category approach; reconsider its use of Tanimoto scores; reconsider dichloromethane as a potentially useful analog; and ensure additional opportunity for stakeholder review before the risk evaluation is finalized to ensure use of the best available science.

EPA Response: Due to limited data on various health effects, EPA could not definitively determine the degree of potency difference between 1,1- and 1,2-dichloroethane due to limitations in the 1,1-dichloroethane database but did determine that using the 1,2-dichloroethane read-across approach is likely human health protective based on available data.

EPA determined that there is consistent evidence that the kidney is a target organ for 1,1- and 1,2-dichloroethane in the Risk Evaluation (Section 5.2.3.1.1). EPA identified studies that indicated immunotoxicity for 1,2-dichloroethane based on finding associated with inhibition of the immune response via a T-Cell-Dependent Antibody Response (TDAR) assay *in vivo*, human T-cells death *in vitro*, thymus necrosis, decreased blood lymphocytes, and decreased resistance to infection. These studies are discussed in Section 5.2.3.1.1 of the Risk Evaluation as part of the hazard identification and the weight of scientific evidence but were not selected for dose-response due to study design limitations.

Hazard identification for 1,2-dichloroethane indicates that that the male reproductive system may be a target as a result of exposure to 1,2-dichloroethane. Although rodents can have drastic changes in sperm with no effects on fertility, slight changes in humans can impact fertility. EPA determined that the Zhang et al. (2017) study was appropriate for dose-response based on the weight of scientific evidence described in Section 5.2.7 of the Risk Evaluation that indicated the testes as a target organ for 1,2-dichloroethane. In this study, significant pathological changes in the testes including vacuolar degeneration of germ cells, decreased sperm concentration, motility, and progressive motility, and increased abnormalities of the sperm (head, body, and tail). The Rao et al. (1980) study was evaluated as were the other studies identified by ATSDR (2024) to have "questionably reliability" due to their limitations in reporting information on study design and results. These four studies did not evaluate sperm parameters and the identification of Zhang et al. (2017) for POD selection based on sperm concentration is considered by EPA as the use of the best available science as this health effect is considered both sensitive and supported by both histological and mechanistic data. Zhang et al. (2017) in addition to the measurement of sperm parameters and histopathology also evaluated potential mechanisms of reproductive toxicity associated with inhalation to 1,2-dichloroethane. The study identified the induction of apoptosis in the germ cells of the mice exposed to 1,2-dichloroethane via inhalation as a potential mechanism for the sperm effects observed. Due to the limited mechanistic information from prior studies on the reproductive effects associated with 1,2-dichloroethane, the Agency is confident in the selection of this study for the POD based on decreased sperm concentration from this study for the intermediate and chronic inhalation duration as the is thus considered to be human health protective.

The use of the Lhasa Derek Nexus computational tool for identification of health alerts to inform the analog identification process for this risk evaluation was not performed as this tool is license-based and thus not publicly available. As EPA employs publicly facing and accessible tools for its risk evaluation this approach was also applied as part of the read-across tool selection. Although EPA does consider CBI submitted information in data analyses, these data did not contradict the analyses performed on the data sources identified as non-CBI in development of the weight of scientific evidence. More details have been incorporated into the read-across narrative for clarification of how the tools were identified and the considerations for implementing the tools in Section 5.2.1.3 of the Risk Evaluation.

EPA is confident that the read-across method using 1,2-dichloroethane was appropriate for the Risk Evaluation.

ATSDR (2015)

Comment 5.2.4

Summary: A public commenter (0066) stated that they reviewed the ATSDR toxicological profiles for 1,1- and 1,2-dichloroethane and that ATSDR concluded 1,1-dichloroethane is unlikely to be a kidney toxicant while 1,2-dichloroethane may lead to kidney toxicity at certain doses or concentrations. The commenter stated that no studies were available for 1,1-dichloroethane in the toxicological profile which evaluated immunological effects following inhalation, oral, or dermal exposures. Additionally, no information on reproductive toxicity for 1,1-dichloroethane was available in the profile. The commenter also reviewed the 1,1- and 1,2-dichloroethane ATSDR toxicological profiles for carcinogenicity evidence, which was inconclusive for 1,1-dichloroethane and may lead to carcinogenicity at certain doses or concentrations for 1,2-dichloroethane. The commenter also discussed genotoxicity evidence from ATSDR (2015) and stated that other analogs besides 1,2-dichloroethane may be more appropriate for application to the 1,1-dichloroethane risk evaluation.

The SACC found that the ATSDR (2015) Toxicological Profile for 1,1-dichloroethane supported the notion that there was a lack of hazard and dose-response data, and the ATSDR assessment did not have any other specific information to support the draft risk evaluation. The SACC stated that the draft risk evaluation included a more comprehensive analysis of studies published before and after 2015, unlike the ATSDR report.

EPA Response: As data were limited for 1,1-dichloroethane, due to study limitations and uncertainties outlined in the hazard identification in the final risk evaluation, it was considered difficult to ascertain if there are differences between 1,1- and 1,2-dichloroethane. AA read-across approach was thus applied, which identified 1,2-dichloroethane as the most appropriate analog, and was considered by EPA to be health protective for 1,1-dichloroethane health effects based on the available data that could be compared between the chemicals to support the analog selection while also considering the inherent data gaps in 1,1-dichloroethane. Identified health effects are described in the final risk evaluation using a weight of scientific evidence approach and the best available science for hazard characterization of data available from both 1,1- and 1,2-dichloroethane that did identify kidney effects as a relevant health effect. An evaluation of the ATSDR (2015) assessment was used for hazard identification through incorporation of identified studies into the systematic review for 1,1-dichloroethane that EPA further refined by conducting an updated literature search past this ATSDR (2015) publication date. All relevant studies that were identified via systematic review and incorporated within the final RE as part of the weight of scientific evidence.

As part of the tiering to identify the most appropriate analog for 1,1-dichloroethane, evidence associated with genotoxicity along with non-cancer and cancer evidence were integrated together to refine the selection of the analog that was ultimately identified as 1,2-dichloroethane based on weight of scientific evidence.

Other Comments

Comment 5.2.5

Summary: The SACC found the presentation of the notes in Table_Apx J13 and J14 of the draft risk evaluation to be inconsistent. The members asked if there is "a way to better link the note to the study rather than leaving as an independent bullet item. The system review conclusions should be defined. For example, what does failed mean?"

EPA Response: The referenced tables have been reformatted and updated in the Risk Evaluation with additional information summarizing why OPPT did not use the study identified in other programs.

Charge Question 4 – Oral, Non-Cancer (Acute)

Storer et al. (1984)

Comment 5.2.6

Summary: A public commenter, in multiple submissions to the docket (0053, 0066, 0067), requested that SACC and EPA consider the quality of the Storer et al. (1984) study and the applicability of the results for use in the dose response assessment for 1,1- or 1,2-dichloroethane. The commenter (0053) specifically suggested that the SACC consider that different scientific studies with varying exposure regimens have identified different effects associated with 1,2-dichloroethane exposures, and that there is a lack of scientific consensus regarding kidney effects from 1,1-dichloroethane exposure. The commenter (0066) also stated that there is no clear consistency of effects on the kidney associated with 1,1-dichloroethane exposures.

The SACC stated that its members expressed different opinions on the study quality, protocol, conduct, and data interpretation of Storer et al. (1984). One SACC member noted that the sample sizes, dosing regimen, and control groups were appropriately defined. The SACC member also said that the sample size was sufficient; however, a higher number of animals would increase statistical significance. The SACC member also said that the use of oral gavage as the route of administration is not an ideal representation of human oral exposure, but it is relevant, and the dose can be delivered in quantity as intended. Another SACC member said that the study did not meet today's standards. The SACC member said that the experimental design was set up for a typical analysis of the variance (ANOVA) with multiple comparisons test for significance, but this design does not allow for fitting a dose-response curve with confidence intervals for ECx values, thereby preventing the derivation of EC10, EC20, and EC50 values with confidence intervals. The SACC member said that there are currently multiple tools for conducting data analysis for exposure-response datasets.

The SACC concurred that the findings of Storer et al. (1984) could be relevant to the assessment of acute toxicity for 1,2-dichloroethane analogs, but it remains unclear whether these findings have any significance for the acute toxicity of 1,1-dichloroethane. The SACC said that "1,2-dichloroethane may not be the best analog to determine acute oral toxicity of 1,1-dichloroethane." The SACC said that 1,1-

dichloroethane has been shown to be less potent than 1,2-dichloroethane in inducing toxicity responses, including kidney toxicity, and kidney toxicity may not be a relevant endpoint for acute oral toxicity determination. Some SACC members provided arguments for the relevance of the kidney toxicity endpoint, saying:

- "This finding was further supported by another study where absolute kidney weight was significantly increased in male rats exposed to 1,2-dichloroethane by gavage for 13 weeks (5 days per week);
- Kidney effects have also been observed in mice administered a lethal intraperitoneal injection of 1,1-dichloroethane; the effects included increased glucose and protein in the urine and tubular swelling;
- In the study by Hofmann et al. (1971), renal injury was observed in cats that were intermittently exposed to 1,000 parts per million (ppm) of 1,1-dichloroethane for 6 hours per day over 13 weeks, following an initial 13-week period of exposure to 500 ppm under the same conditions."

Other SACC members argued against the relevance of the kidney toxicity endpoint, stating:

- "Relative kidney weights were not affected by 1,1-dichloroethane in acute/subacute studies and elevated serum enzyme levels, histopathological changes, and abnormal urinalyses were not manifested;
- The absence of a nephrotoxic effect in other species and in other studies where 1,1-dichloroethane was administered orally suggests that the observed effect may be species-specific or influenced by factors unique to the study conditions;
- 1,1-dichloroethane is not considered a potent hepatotoxic, nephrotoxic, or carcinogenic agent, as available evidence indicates that its toxicity in the liver, kidneys, and potential for cancer development is low."

Overall, the SACC said that "the acute kidney response to 1,2-dichloroethane in mice does not accurately represent 1,1-dichloroethane response in mice and moreover, human response to both of these chemicals due to significant differences in metabolism, renal physiology, and dose-response relationships."

The SACC provided several recommendations for EPA:

- "While EPA provides transparent data and technical analyses, some sections lack clear scientific interpretation. The EPA should revise Section 5.2.6.1.2 (lines 7526–7542) and other relevant sections where technical work is presented but not fully explained by including additional explanations that emphasize the 'why.' This additional context could strengthen the presentation and improve stakeholder and public understanding. For example, explain the importance of doses tested in Storer et al. (1984) to highlight that the closely spaced dose levels provide a stronger basis for dose-response modeling compared to other studies (*e.g.*, Morel et al. (1999)). Similarly, clarify why benchmark dose (BMD) modeling of serum [blood urea nitrogen] is mentioned, as it offers a formal analysis of the observed trend, which the original study did not include.
- Lines 6619-6622: The two sentences here regarding the Zabrodskii et al. (2004) study should be re-worded/clarified. The Zabrodskii et al. (2004) study did not identify the isomer used and was therefore labeled 'Uninformative'. However, because this assessment is applying read-across from [1,2-dichloroethane], this study remains relevant for hazard identification.
- A weight-of-evidence approach that integrates data from multiple *in vitro* and *in vivo* studies can provide a more robust and comprehensive basis for deriving the acute oral POD for 1,1-dichloroethane and [1,2-dichloroethane].

To better assess human risk, it would be more appropriate to incorporate *in vitro* human kidney models and physiologically based pharmacokinetic (PBPK) modeling (it will be more efficient and cost effective). The PBPK models can be defined based on kinetic constants derived from *in vitro* studies and then reverse translate the obtained *in vitro* concentration-response curves to predict *in vitro* dose-response curves."

EPA Response: EPA applied a read-across approach and weight of scientific evidence to support the selection of the POD and this justification has been further described in the Risk Evaluation to emphasize the relevance of the selection of the renal endpoint identified in Storer et al. (1984).

The Zabrodskii et al. (2004) study that was identified as "uninformative" was incorrectly characterized in the draft risk evaluation and the systematic review rating has been updated in the Risk Evaluation to the actual systematic review rating of "medium." This study has been further described in the hazard identification and weight of scientific evidence conclusions in the Risk Evaluation (Section 5.2.3). EPA acknowledges that the acute oral toxicity data for 1,1-Dichloroethane is limited to one *in vivo* study that was rated as "medium" in the systematic review conducted to inform the dose-response analyses.

Benchmark (BMC) Analysis and Response Level

Comment 5.2.7

Summary: A public commenter, in multiple submissions to the docket (0066, 0067), expressed concern regarding the use of appropriate PODs, BMD modeling, and uncertainty factors in the dose response assessments for either 1,1- or 1,2-dichloroethane. The commenter requested that EPA consider the applicability and potential impacts of bolus dosing on the identified potential effects.

In another submission to the docket (0053), the commenter discussed that EPA only used information relevant to the gavage dosing regimen, adding that this may reduce the applicability of the dose response relationship to dermal exposures which are unlikely to involve bolus dosing.

EPA Response: EPA considered both drinking water and gavage studies. The selection of the studies that are the basis of the oral PODs were categorized into a subset of studies that were characterized as potential candidates based on systematic review. Studies that were rated as "uninformative" for dose-response based on key metrics that resulted in greater uncertainty to the delivered dose were not considered appropriate for POD selection.

Comment 5.2.8

Summary: The SACC stated that EPA neglected to acknowledge that the preferred approach to model selection includes consideration of the underlying biological process and said that it is appropriate that the statistical considerations of the analysis guide the selection of the model. The SACC recommended that EPA "add discussion/acknowledgement of the limit biological data/knowledge."

The SACC also suggested that in Lines 1834 to 1836 of the Supplemental Information File: Benchmark Dose Modeling Results for 1,1-Dichloroethane (U.S. EPA, 2024a), "EPA should cite the guidance that supports the statement 'A [benchmark response (BMR)] of 10 percent relative deviation … was also selected because EPA considers a 10 percent change in relative kidney weight to be biologically significant.'"

EPA Response: The use of a BMR of 10 percent is consistent with EPA policy (U.S. EPA, 2012). EPA considered the biological processes and data variability in selection of model and BMR values.

Alternative Studies

Comment 5.2.9

Summary: The SACC said that the literature review did not identify any alternative studies suitable for use in deriving an acute oral POD for 1,1-dichloroethane and 1,2-dichloroethane. However, the SACC said that there are new types of studies that may enable improvements in data quality, analysis and interpretation. The SACC suggested "that these types of studies would improve the quality of the data and add information on modes of action."

The SACC provided several recommendations:

- "*In vitro* tests can be used to study the effects of [1,1-dichloroethane] and [1,2-dichloroethane] on various organs by utilizing primary cells or cell lines from different origins, including kidney, liver, respiratory, and intestinal models, as well as brain organoids, incorporating metabolically competent 3D tissue models.
- Metabolism and biotransformation, lipid peroxidation and oxidative stress, deoxyribose nucleic acid damage, inflammation, fibrosis, change in morphology and barrier function, changes in specific marker expression, cytokine and gene expression can be analyzed by multiple methods.
- Effect on human kidney could be tested on *in vitro* proximal tubule kidney epithelial tissue model by modeling kidney specific toxicity and acute kidney injury.

[Central nervous system] depression could be due to lipophilicity and crossing blood-brain barrier and it can be tested with *in vitro* assays on Blood-Brain models, brain organoids."

EPA Response: EPA used the best available information in deriving an acute oral POD. As part of the weight of scientific evidence approach, EPA integrated identified *in vitro* and mechanistic evidence where applicable with evidence identified in humans and from laboratory animals into the overall confidence statements for each health effect identified. The suggestions provided from the SACC refer to these types of studies which were considered if identified in the literature review. EPA, as part of the literature review, considers the incorporation of alternative studies within this process as a means to present the best available science and provide a comprehensive evaluation regarding the data across data streams.

Charge Question 5 – Oral, Non-Cancer (Short-Term and Chronic)

Munson et al. (1982)

Comment 5.2.10

Summary: In multiple submissions to the docket (0066, 0067), a public commenter stated that it is inappropriate to use the results of the 14-day gavage study to inform potential hazards associated with 1,2-dichloroethane exposure, adding that Munson et al. (1982) confirms that chronic exposures to 1,2-dichloroethane via drinking water are unlikely to cause immunotoxic effects. The commenter recommended that EPA follow the ATSDR's reasoning with respect to use of the gavage study and reevaluate the conclusion that 1,2-dichloroethane is immunotoxic. The commenter additionally requested that EPA reconsider the use of Munson et al. (1982) for derivation of benchmarks for 1,1- and 1,2-dichloroethane. The commenter (0067) stated that accurate prediction of toxicity and dose response via the oral route is essential for the 1,2-dichloroethane draft risk evaluation, given anticipated use of the oral benchmarks for the prediction of dermal risk for workers exposed to 1,2-dichloroethane.

In contrast, a public commenter (0062) requested that EPA use the 14-day gavage study from Munson et al. (1982) in selection of the oral non-cancer short-term and chronic PODs, consistent with the best available science.

EPA Response: In response to the comments on the use of the Munson et al. (1982) study, EPA reevaluated the oral data available for 1,1- and 1,2-dichloroethane to develop its reasoning and justification for either maintaining the study as the basis for the intermediate/chronic oral POD or shifting to a different study and POD. The oral data for the intermediate and chronic oral exposure durations were plotted as a dose-response array and categorized by health effects in the RE that illustrates that several studies show adverse effects to the kidneys at similar dose levels and agreed that the most appropriate endpoint for 1,2-DCA oral exposures are effects to the kidneys instead of the originally proposed POD based on immunotoxicity. The POD was changed from Munson et al. (1982) in the draft to a NTP (1991) oral gavage study in rats based on increased relative kidney weight effects. Due to limited data to support the continued use of the Munson et al. (1982) study for dose-response and as the basis for the POD for both the intermediate and chronic oral POD, EPA still considers this heath effect as sensitive and of concern thus an integration of evidence for the immunological endpoint in the hazard identification (Section 5.2.3.1.1) is presented in the risk evaluation. See Section 5.2.6 of the final risk evaluation for the justification on the revision to the oral intermediate/chronic POD from immunotoxicity to renal toxicity.

Comment 5.2.11

Summary: The SACC expressed concern that the ORD and ECRAD had different opinions on Munson et al. (1982). The SACC said it agreed with the ORD decision to not select this study, as there are scientific issues related to human relevance, dose selection, metabolism, and unknown mechanistic understanding. For example, the SACC said that the study "only focused on short term exposures, which might not be relevant since it is likely that much of this exposure for humans is occupational, suggesting that it could be more long term/chronic exposures in humans." Additionally, the SACC said that the study "notes that the sub-chronic 90-day exposure is believed to produce an adequate manifestation of chemical toxicity, except for mutagenic and reproductive effects." The SACC said that this is a critical limitation. "If there are reproductive effects, this would represent a critical population who is uniquely susceptible to chemicals." Also, the SACC said that the impact on female rats was not shown, and it is unclear if the dosage administered for dichloroethane reflects human level exposures.

The SACC said that "EPA must weigh and explain the related uncertainties/considerations including the route of exposure, the type of effect observed and whether that effect would have longer-term or chronic consequences. These considerations then inform the adjustments/uncertainty factors that are reflected in the Margin of Exposure used for risk characterization."

With regards to the statistical analysis, the SACC said that there are limitations if the goal is to set concentrations for estimating the initiation of effects. In other words, the benchmark dose lower confidence limit (BMDL) using regressing methods to estimate a level equal to a preset limit. The SACC said that the selection of a no observed effect level is not equivalent. The SACC also said that they could not find any indication of the statistical power of the analyses that used ANOVA, and no indication of effective concentration (EC) values below the EC50 could be found. The SACC said they understand that during the 1980s to mid-1990s, computing regressions was more challenging, but it was possible to make these calculations using programs from various EPA and other laboratories during that time.

Lastly, the SACC said that the ATSDR (2024) Toxicological Profile for 1,2-dichloroethane was finalized in July 2024 and "should be reviewed and the draft risk evaluation updated accordingly."

EPA Response: Although immunotoxicity was identified as a health effect concern due to 1,2-dichloroethane exposures, EPA reevaluated the oral data available for 1,1- and 1,2-dichloroethane to further develop the weight of evidence for this health effect. The oral data was plotted as a dose-response array that was included in the final RE and it was agreed that the most appropriate endpoint for 1,2-dichloroethane oral exposures are effects to the kidneys based on refined hazard characterization and weight of scientific evidence conclusions. The POD was changed from Munson et al. (1982) (immunotoxicity) in the draft to an NTP (1991) oral gavage study for relative kidney weight effects. See Sections 5.2.6 and 5.2.7 of the final risk evaluation for details pertaining to the weight of evidence conclusions in the selection of the updated POD for the intermediate and chronic oral durations.

EPA has reviewed the ATSDR (2024) Toxicological Profile as a source for potential refinement in the selection of the PODs proposed in the risk evaluation and assist in the hazard characterization of additional studies that may inform the weight of scientific evidence. The risk evaluation incorporates studies identified in the ATSDR (2024) Toxicological Profile for 1,2-Dichlorethane for hazard characterization for both 1,1- and 1,2-dichloroethane to support the analog selection and identified POD for hazard as the most appropriate and human health protective.

Alternative Studies

Comment 5.2.12

Summary: A public commenter (0053) recommended that EPA expand charge question 5 to direct the SACC to consider Munson et al. (1982) and NTP (1991) as additional resources for sub-chronic or chronic studies to characterize the dose response of 1,2-dichloroethane. The commenter stated these studies use a dosing regimen and duration that is more consistent with the target benchmarks than the study currently in use by EPA. In another submission to the docket (0067), the commenter suggested EPA reconsider other available studies, including those involving drinking water administration, in deriving oral exposure limits for 1,2-dichloroethane.

EPA Response: EPA did not change the charge question as a result of this comment, as EPAEPA felt that charge question 5 was sufficiently broad for the SACC to consider the issues raised by the commenter. All identified studies underwent SR to consider their appropriateness for dose-response derivation. In the final RE, EPA uses a weight of scientific evidence and best available science approach. Any studies provided to EPA during SACC meeting or final report or submitted via public comments were considered, evaluated and integrated into the final RE as appropriate.

Comment 5.2.13

Summary: The SACC expressed concerns because ORD and ECRAD also had different opinions on the NTP (1991) study. The SACC stated that it was more appropriate to use the NTP (1991) study as compared to the Munson et al. (1982) study for deriving short term and chronic PODs. As such, the SACC recommended "using the NTP (1991) study for deriving PODs." The SACC also had a number of editorial comments:

- "On p. 273, lines 7660-7663, 'EPA's independent convergence on Munson et al. (1982) for the non-cancer oral, short-term POD selection is validated by the ATSDR (2022) Toxicological Profile for 1,2-Dichloroethane, which also identified immunosuppression as the most sensitive

> human health protective endpoint.' What does 'independent convergence' mean? The SACC recommends rewording with direct/simpler language. EPA selected findings from this study for the non-cancer oral, short-term POD. The 'validated by' language here is misleading because ATSDR did not rely on the 14-day study from Munson et al. (1982) for its [minimal risk level]. The ATSDR (2024) report does provide support for concern about the immunological endpoint; it is noted to be one of the 'most sensitive targets of [1,2-dichloroethane] oral exposure' ((ATSDR, 2024), p. 2)

Reviewers also had concerns regarding the statistical analysis of the NTP (1991) study, and these concerns and suggestions are reflected in our response to charge question 5a."

EPA Response: In reviewing the NTP (1991) study identified by ORD based in systematic review, EPA identified the rat study cohort based on dosage via drinking water as not suitable for derivation for dose-response due to uncertainties in 1,2-dichloroethane exposures due to evaporation and spillage concerns during the study duration. EPA did, however, use the NTP (1991) study based on the rat cohort administered 1,2-dichloroethane via oral gavage that was presented in the same study to develop the updated POD for the oral/dermal intermediate and chronic durations now based on increased relative kidney weight. The previously presented POD for the intermediate and chronic oral POD based on Munson et al. (1982) observed in mice, based on an immunological endpoint, is presented in the final risk evaluation in the hazard characterization for immunological effects. The weight of scientific evidence though limited for immunological effects, is still an endpoint of consideration even though no longer the basis of the intermediate nor chronic POD. This is a similar conclusion to that presented by the ATSDR (2024) Toxicological Profile for 1,2-Dichloroethane that indicated immunotoxicity as the most sensitive endpoint. EPA has refined the language to be more direct regarding the considerations regarding the immunological endpoint and the subsequent refinement to the POD to the renal toxicity. Specifically, EPA has changed the immunosuppression description to remove the terms "convergence" and "validated."

A statistical analysis of the NTP (1991) study performed and the data were amenable to benchmark dose modeling and this value is proposed POD presented in the final risk evaluation for 1,1-dichloroethane for the intermediate and chronic oral durations.

Comment 5.2.14

Summary: The SACC said that they did not identify alternative studies for deriving oral short-term and chronic PODs. One SACC member agreed with the suggestion that "EPA should consider using the ATSDR, 20215 Toxicological Profile for 1,1-dichloroethane for use in deriving oral short-term and chronic PODs for those compounds." Another SACC member suggested also "reviewing the OECD (2002) Screening Information Dataset (SIDS) for High Production Volume Chemicals: 1,2Dichloroethane (CAS # 107-06-2) (OECD, 2002), because the OECD SIDS report compiles data on high-production chemicals, including comprehensive toxicological data for [1,2-dichloroethane]."

EPA Response: EPA reviewed the two suggested reports and is confident that the relevant studies in these documents were captured and reviewed in the systematic review process.

Uncertainty

Comment 5.2.15

Summary: The SACC stated that the use of short-term and sub-chronic studies to assess the potential for chronic, long-term exposure to 1,1-dichloroethane can introduce significant uncertainty, including:

- "Potential for uncertainty may arise from extrapolating data from animal studies to humans and the absence of epidemiologic studies.
- Short-term and sub-chronic studies tend to involve higher doses than the lower doses used in chronic studies. Effects observed at high doses might not manifest or might manifest differently at lower chronic exposures. Short-term and sub-chronic studies may not capture the full spectrum of effects that may develop from prolonged, low-level exposure. Also, delayed effects may not be observed in examining acute or early toxic responses. It may be necessary to adjust for the possibility of identifying a lower POD for chronic toxicity when extrapolating from a study of shorter duration.
- Biological mechanisms leading to toxicity in chronic exposures can differ from those occurring in short-term exposures."

The SACC emphasized that because there is inevitably uncertainty associated with using short-term and sub-chronic studies for assessing chronic, long-term exposure to 1,1-dichloroethane, EPA should instead ask how best to quantify the amount of uncertainty. The SACC recommended that "EPA should work to quantify the uncertainty in extrapolations from shorter-term duration to those of longer durations."

EPA Response: EPA included uncertainty factors to account for extrapolation from animals to humans as well as within the human population as described in Section 5.2.6.1.1 that were carried through from the draft to final risk evaluations. Additionally, a UF_S of 10× was retained from the draft to final risk evaluation to account for the uncertainty of extrapolating from an intermediate to a chronic duration (Section 5.2.6.1.1). EPA reviewed studies for the chronic duration that would minimize uncertainty associated with extrapolation from an intermediate duration and these studies are described in Section 5.2.6.1.4. Due to the identified the uncertainties and limitations of the chronic studies identified and evaluated that precluded their use for the chronic POD, a rationale for their use instead of the intermediate duration studies and the applied uncertainty factor for the duration adjustment was provided.

Other Comments

Comment 5.2.16

Summary: A public commenter (0068) applied World Health Organization (WHO) International Programme on Chemical Safety (IPCS) methodology to 1,2-dichloroethane chronic oral exposures using the POD values reported by EPA to estimate risk-specific doses for several levels of incidence. The commenter found lower bound (95% confidence) chronic human inhalation doses of 0.002 mg/kg-d, 0.0012 mg/kg-d, 0.0006 mg/kg-d, 0.0003 mg/kg-d, and 0.0001 mg/kg-d at which immunosuppression is expected in 1, 0.5, 0.1, 0.01, and 0.001 percent of the population, respectively. The commenter also estimated that EPA's current approach results in acceptance of exposures producing an upper bound risk level 3,000 times higher than the typical target risk level for protection of carcinogenic risks. The commenter provided a complete analysis of the 1,1- and 1,2-dichloroethane non-cancer risk using IPCS methodology in a technical appendix. The commenter stated that an "important caveat" to the

calculations is that values used to represent human variability may be understated, and if variability is underestimated, then the risk at each dose will be underestimated. The commenter requested that EPA apply the WHO framework to these endpoints and additional noncancer endpoints to better inform its risk characterization and risk determination for both 1,1- and 1,2-dichloroethane.

EPA Response: EPA sees value in considering the methodology for use in future risk assessments for hazard characterization and informing risk management decisions. While methods have been proposed, EPA does not have peer-reviewed approaches to apply these methods under TSCA.

Charge Question 6 – Inhalation, Non-Cancer (Acute)

Dow Chemical (2006)

Comment 5.2.17

Summary: A public commenter (0062) stated that EPA should use the BMDL from Dow Chemical (2006) for the inhalation non-cancer acute POD. The commenter discussed that the selection of the BMDL or the no-observed-adverse-effect level (NOAEL) for the POD must be reviewed using scientific judgment, and that the BMD modeling for nasal lesions in Dow Chemical (2006) has strong goodness of fit metrics.

In contrast, a public commenter (0053) stated that the Dow Chemical (2006) study is not publicly available for review.

EPA Response: EPA agrees with public commenter (0062) on the use of the BMDL for the inhalation non-cancer acute POD. The findings from the Dow Chemical (2006) study were published in a peer-reviewed journal by Hotchkiss et al. (2010) and are available for review.

Comment 5.2.18

Summary: The SACC said that the Dow Chemical (2006) study is acceptable and in-line with TSCA expectations and requirements, and that the conduct of the study was well-documented and in-line with studies of similar nature. The SACC asked EPA to explain the use of the continuous (24 hours/day) exposure to determine an "acute" POD. The SACC said that Table 5-43 stated that the adverse effect in the 8-hour acute study is degeneration with necrosis of the olfactory neuroepithelium and that this effect is neurological in nature. Moreover, in the recent ATSDR (2024) assessment for 1,2-dichloroethane, this same study effect was determined to be respiratory in nature. Therefore, the SACC said that a rationale is needed to consider this adverse effect as neurological versus respiratory tract toxicity, as there was no evidence presented in the animal study that there were direct neurological consequences following the necrosis of the nasal epithelium. Finally, the SACC provided an editorial comment regarding a discrepancy in the worker human equivalent concentration values in Tables 6-1 and 5-49. The SACC also stated that various points of clarification are needed: "the determination that degeneration with necrosis of the olfactory neuroepithelium effect is neurological in nature since there appears to be no evidence of a direct neurological effect from the Dow Chemical (2006) study; the high uncertainty in the [BMD] model fitting, warrants obtaining more data or use of the NOAEL/[lowest-observed-adverse-effect level (LOAEL)] approach."

EPA Response: EPA converted all studies identified for dose-response to a 24-hour duration as input into BMD modeling. This method was applied to allow for a comparison of HED/HEC values across studies so that the output from the modeling can be compared between the studies of differing duration

(*i.e.* 4-hour vs. 6-hour, etc.). The initial duration normalization that is representative of a continuous (24-hour) duration was applied to general population scenarios and subsequently adjusted to the worker (8-hour) duration for the respective occupational scenarios.

EPA has incorporated language to better characterize the necrosis to the olfactory as respiratory in nature as definitive effects to olfactory capacity were not evaluated as part of the study (Section 5.2.3.1.2 of the Risk Evaluation).

EPA has corrected the discrepancy in the worker human equivalent concentration in the tables referenced by the SACC.

EPA has provided more information about BMD modeling and the suitability of this approach in the risk evaluation (Section 5.2.6.1) and *Risk Evaluation for 1,1-Dichloroethane – Supplemental Information File: Benchmark Dose Modeling* (U.S. EPA, 2025b).

BMC Analysis and Response Level

Comment 5.2.19

Summary: A public commenter, in multiple submissions to the docket (0053, 0066, 0067), stated that the Dow Chemical (2006) dataset is not well-suited for BMD modeling per EPA's own technical guidance given the lack of data at the desired benchmark response level. The commenter (0066, 0067) recommended that EPA instead utilize a NOAEL/LOAEL approach to dose response modeling.

Additionally, the commenter (0053) stated that the SACC should comment on EPA's departure from its 2012 BMD Technical Guidance. The commenter (0067) requested that EPA reevaluate its methodology for BMD modeling to confirm the appropriate identification of a benchmark. The commenter (0053) also stated that the uncertainty factor of 10 for human-to-human variability in a worker population is overly conservative and requested (0066) that EPA consider revising its use.

EPA Response: EPA has provided more information about BMD modeling and the suitability of this approach in the risk evaluation (Section 5.2.6.1) and *Risk Evaluation for 1,1-Dichloroethane – Supplemental Information File: Benchmark Dose Modeling* (U.S. EPA, 2025b). EPA used an uncertainty factor of 10 for human-to-human variability in worker population to be health protective, since there was insufficient data available to justify derivation of a different uncertainty factor.

Comment 5.2.20

Summary: The SACC agreed that BMD modeling should be carried out for females or males separately (4- and 8-hour studies) and for the combined males and females 4-hour acute exposure study. However, in each case the models failed to predict a BMDL because of the high uncertainty at the lower end of the dose response curve (10 percent effect level). The SACC said that the combined male and female 4-hour study, even for the best fit model (the Multistage 3) where the Akaike information criterion is the lowest, the BMDL was lower than the NOAEL. The SACC said that, based on the EPA BMD modeling guidance, where there is greater uncertainty in the model fitting, it is warranted to obtain more data or use the NOAEL/LOAEL approach. The SACC questioned why EPA converted exposures to a 24-hour equivalent before carrying out the modeling to identify the "acute" POD, because in doing so, the concentration at which an effect was observed is artificially lowered. The SACC agreed that extrapolation of the 4-hour or 8-hour to longer or shorter durations, can be done, but it depends on the study design, the feasibility of the endpoint with the exposure pattern, and the limit to be derived. The

SACC said that EPA should consider deriving different PODs for occupational and general populations, as exposure profiles are different for each population of interest.

EPA Response: EPA has provided more information about BMD modeling and the suitability of this approach in the Risk Evaluation (Section 5.2.6.1) and *Risk Evaluation for 1,1-Dichloroethane – Supplemental Information File: Benchmark Dose Modeling* (U.S. EPA, 2025b). EPA converted all studies identified for dose response to a 24-hour duration as input into BMD modeling and considered this approach appropriate for the studies used in the risk evaluation. This method was applied to allow for a comparison of HED/HEC values across studies so that the output from the modeling can be compared between the studies of differing duration (*i.e.* 4-hour vs. 6-hour, etc.). The initial duration normalization that is representative of a continuous (24-hour) duration was applied to general population scenarios and subsequently adjusted to the worker (8-hour) duration for the respective occupational scenarios.

Alternative Studies

Comment 5.2.21

Summary: A public commenter (0053) suggested that the Hotchkiss et al. (2010) study appears to be a peer-reviewed version of the Dow Chemical (2006) study and is of high quality and was conducted under Good Laboratory Practices.

EPA Response: As indicated by the commenter, Hotchkiss et al. (2010) is a peer-reviewed publication based on Dow Chemical (2006) study. EPA evaluated the Dow Chemical (2006) study as it is the source of the data that was extracted in Hotchkiss et al. (2010). EPA has included within evidence integration both citations in the instances when common data between the two sources was evaluated and extracted.

Comment 5.2.22

Summary: The SACC said that no studies beyond those listed by ECHA were identified for use in establishing the POD for 1,1-dichloroethane.

EPA Response: EPA agrees with the SACC's findings.

Expand the Charge Question

Comment 5.2.22

Summary: A public commenter (0053) recommended that EPA expand charge question 6 to specify that the draft acute non-cancer OEV was derived by EPA from the POD identified using the discussed BMD modeling of the Dow Chemical (2006) study and presented in Appendix N of the draft risk evaluation. The commenter additionally recommended that the following request be appended to the end of the charge question: "d) Please comment on the derivation of the acute non-cancer occupational exposure value presented by EPA in Appendix N, including the appropriateness of the underlying study/data used and the overall uncertainty factors used."

EPA Response: EPA did not change the charge questions as a result of the comments from Commenter 0053, as EPA felt that charge question 6 was sufficiently broad for the SACC to consider the Dow Chemical (2006) study.

Charge Question 7 – Inhalation, Non-Cancer (Short-Term and Chronic)

Zhang et al. (2017)

Comment 5.2.23

Summary: A public commenter, in multiple submissions to the docket (0053, 0066, 0067), requested that EPA and SACC consider the consistency of findings for reproductive toxicity when evaluating the appropriateness of Zhang et al. (2017) for the identification of a POD for 1,2-dichloroethane. The commenter (0066, 0067) added that there is currently no evidence of repeatability of the study results. The commenter also discussed that while EPA states in the 1,2-dichloroethane draft human health hazard assessment and 1,1-dichloroethane draft risk assessment that fertility of human males is known to be sensitive to changes in sperm numbers and quality, Zhang et al. (2017) did not examine potential effects on fertility across generations.

EPA Response: EPA has further developed the hazard identification and Weight of Scientific Evidence narratives to better characterize why this study was selected as the POD for the intermediate and chronic durations (Sections 5.2.6.1.3 and 5.2.6.1.4).

Comment 5.2.24

Summary: The SACC stated that there are a number of shortcomings identified in the Zhang et al. (2017) study, however, a number of these issues, including male only evaluations and limited endpoints evaluated within the study, are addressed in the other studies found in Table 5-45. The SACC said that it is unclear whether this study was done according to a standardized guideline or done under good laboratory practices. The SACC submitted several comments regarding "questionable" details of the study: "the study reports that all mice were housed and acclimated but details such as individually or as exposure groups was not stated; The study used whole body dynamic inhalation chambers. This type of exposure allows "grooming" and ingestion of exposure chemical. Under these conditions the inhaled dose would underestimate the total dose received; It is unclear how particles in the lung bronchi indicate more than 90 percent of the aerosol particles in the [1,2-dichloroethane] exposure chambers were less than or nearly equal to 1.1 micrometers."

The SACC submitted several comments regarding the "appropriateness" of the study:

- "It appears that the study was done to determine the mode of action [(MOA)] for changes in sperm, not to determine a NOAEL.
- This study does not meet the standard for analysis of short term/subchronic and chronic noncancer inhalation POD derivation. The following endpoint deficiencies are noted:
    - Male mice only, no females
    - Incomplete evaluation of standard endpoints for assessment of toxicity and for deriving POD for short and chronic inhalation exposures
- Standard organ evaluations are lacking (gross evaluation, organ weights and histology, including no evaluation of the respiratory tract for this inhalation study knowing that this material can cause respiratory tract irritation at shorter duration and lower concentrations). Clinical chemistry is lacking. Clinical observations are lacking. Hematological parameters are lacking.
- For derivation of health protective limits this 4-week study is used to support short-term/subchronic and chronic with addition of 3 and 10 uncertainty factors, respectively. Please provide the guidance followed by EPA for duration [uncertainty factor] for extrapolating from a

> 4-week study to chronic and subchronic durations. Typically, a 10X [uncertainty factor] is used for extrapolating a 90-day study to chronic exposure duration. The current approach is inconsistent with that.

The SACC questions if the 4-week exposure duration of the Zhang et al. (2017) study is adequate to demonstrate the health effect."

EPA Response: EPA acknowledges that a nose-only study would be the preferred method for inhalation; however, EPA determined that the dosing methods used in the Zhang et al. (2017) study were sufficient since 1,1-dichloroethane will rapidly volatilize, making inhalation the major pathway.

The objective of the study was to monitor at the effects of 1,2-dichloroethane on the male reproductive system and to elucidate underlying mechanisms of toxicity, via the inhalation route of exposure, thus females were not included in the study. The study was not intended to be a classical inhalation study with respiratory tract evaluations nor neurotoxicity endpoints. The study provided functional sperm parameters for POD selection, such as sperm concentration (the basis of the intermediate and chronic inhalation point of departure), spermatozoa malformations, histology of the testes and epididymis, seminiferous tubule diameter and geminal epithelial height were measured as well as mechanism of action data. The study measured hormones (testosterone, luteinizing hormone, follicle stimulating hormone, etc.) in plasma as part of their clinical chemistry panel. Additionally, body weight and testis/body weight ratio was evaluated at 1 and 4 weeks. EPA has provided greater clarification of the application of the uncertainty factors to the Zhang et al. (2017) study (Section 5.2.6.1.1 and 5.2.6.1.4). EPA has confidence in the use of this study to characterize the health effects identified in Zhang et al. (2017). A dose response array for inhalation non-cancer studies for 1,2-dichloroethane that was added to Section 5.2.6.1.5 to illustrate that the effects observed in Zhang et al. (2017) are protective of other human health outcomes.

BMC Analysis and Response Level

Comment 5.2.25

Summary: A public commenter (0053) stated that the benchmark response of 5 percent and the uncertainty factor of 10 for human-to-human variability in the worker population are overly conservative.

In additional submissions to the docket (0066, 0067), the commenter expressed concern regarding the BMD modeling of data in Zhang et al. (2017) in the risk evaluation. The commenter stated that EPA's rationale for the choice of the BMCL5 must be explained by the Agency, adding that use of a $BMDL_{10}$ is more supported based on past EPA risk evaluations. The commenter (0066) also recommended EPA consider revising its use of the uncertainty factor of 10 and instead using one in the range of 3-5.

A public commenter (0068) applied WHO IPCS methodology to 1,2-dichloroethane chronic inhalation exposures using the POD values reported by EPA to estimate risk-specific doses for several levels of incidence. The commenter found lower bound (95% confidence) chronic human inhalation doses of 0.4 ppm, 0.3 ppm, 0.1 ppm, 0.05 ppm, and 0.02 ppm at which decreased sperm concentration is expected in 1, 0.5, 0.1, 0.01, and 0.001 percent of the worker population, respectively. The commenter also stated that the analysis found an upper bound risk at an inhalation exposure of 0.07 ppm of 0.025 percent. The commenter provided a complete analysis of the 1,1- and 1,2-dichloroethane non-cancer risk using IPCS methodology in a technical appendix. The commenter stated that an "important caveat" to the calculations is that values used to represent human variability may be understated, and if variability is

underestimated, then the risk at each dose will be underestimated. The commenter requested that EPA apply the WHO framework to these and additional noncancer endpoints to better inform its risk characterization and risk determination for both 1,1- and 1,2-dichloroethane.

EPA Response: EPA chose the benchmark response of 5 percent as it is considered to be biologically significant for humans and set an uncertainty factor of 10 for human-to-human variability in the worker population as data were not identified that would justify a lower uncertainty factor. EPA concluded that a BMR of 5 percent to be appropriate for the severity of effects that can result in significant reproductive effects, including decreased fertility and viability. EPA acknowledges that the modeling is not ideal because the BMD is low on the dose-response curve compared with the doses tested in the study. However, BMD modelers identified the importance of choosing a BMR *a priori*. EPA has identified publications in previous risk evaluations that support the use of this BMR based on germ cell degeneration or depletion in seminiferous tubules (Blessinger et al., 2020; Lanning et al., 2002). Even if the effects are not life-threatening to the parents, the possibility of decreased viability in offspring is of concern.

EPA sees value in considering the WHO methodology (Guidance Document On Evaluating And Expressing Uncertainty In Hazard Characterization) (WHO, 2018) for use in future risk assessments for hazard characterization and informing risk management decisions. While methods have been proposed, EPA does not have peer-reviewed approaches to apply these methods under TSCA.

Comment 5.2.26

Summary: The SACC said that clarification is recommended for the selection of the BMR.

EPA Response: EPA has provided the biological relevance of the benchmark response selected in the risk evaluation in the final benchmark dose response supplemental file (U.S. EPA, 2025b).

Alternative Studies

Comment 5.2.27

Summary: A public commenter, in multiple submissions to the docket (0053, 0066), stated that Rao et al. (1980) did not identify effects on fertility, gestation or survival in male or female rats exposed to 150 ppm, adding (0066) that EPA failed to appropriately weigh the negative findings in this study. The commenter (0053) said that additional studies that may provide insight into potential inhalation toxicity associated with 1,2-dichloroethane exposure include Zhong et al. (2022), Liang et al. (2021), and Nagano et al. (2006). Additionally, the commenter (0066, 0067) discussed Campbell et al. (2009) and Sweeney and Gargas (2016).

EPA Response: The developmental endpoints in the Rao et al. (1980) study were not identified but this study also identified mortality in the maternal rats which is not usually considered a sensitive endpoint. EPA has further developed its weight of scientific evidence based on incorporation of these studies into the hazard identification, where appropriate.

Comment 5.2.28

Summary: The SACC said that EPA should review the four acute inhalation studies and two repeat dose studies on 1,2-dichloroethane on the ECHA's chemical database website for their possible use in a weight-of-evidence approach. The SACC did not identify any additional studies for 1,1-dichloroethane. The SACC submitted additional recommendations in response to Charge Question 7.c.:

- "Provide clearer justification of using this study for determining a POD including the exposure conditions (whole body chambers), aerosol particle deposition, exposure duration in relation to duration of spermatogenesis.
- Discuss and account for potency differences.
- Clarify the application [uncertainty factors] for extrapolation of the 4-week duration to short-term and chronic durations.
- Add more thorough discussion/consideration of the uncertainty around and implications of the read-across.
- At least a brief mention of the rationale for the selection of the BMR to the Draft Human Health Hazard Assessment Technical Support Document… As stated in the Supplemental Information File: Benchmark Dose Modeling Results in Section 2.1.1.2.4.1, lines 2197-2198, 'A BMR of five percent relative difference… was also selected because EPA considers a five percent change in sperm concentration to be biologically relevant.' This statement in the Supplemental Information File needs to include a reference to the relevant EPA guidance document.

The SACC cautioned that if study and endpoint are not suitable or appropriate then the BMC analysis is not warranted or informative."

EPA Response: EPA has reviewed relevant studies on the ECHA chemical database website and incorporated them in the hazard characterization where appropriate.

In some strains of rats and mice, production of normal sperm can be reduced by up to 90 percent or more without compromising fertility (Working, 1988; Robaire et al., 1984; Meistrich et al., 1982; Aafjes et al., 1980). However, less severe reductions can cause reduced fertility in human males who appear to function closer to the threshold for the number of normal sperm needed to ensure full reproductive competence. This difference between test species and humans suggests that results from a test species may not fully represent toxicity in humans due to chemical exposure.

Due to limited data for 1,1-dichloroethane, assessing potency between 1,1- and 1,2-dichloroethane is difficult as similar testing models, durations and common health effects are needed to determine potency differences.

The application of an uncertainty factor for extrapolation from the 4-week duration to chronic duration was based on an evaluation of chronic studies via the inhalation which, due to study limitations and underlying uncertainties as outlined in Section 5.2.6.1.4, were not identified as suitable for use as the chronic POD. Thus, application of the uncertainty factor for sub-chronic-to-chronic duration extrapolation (UF_S) was applied to this 4-week short-term study. Details for the application of this uncertainty factor are described in Section 5.2.6.1.1 and 5.2.6.1.4 of the Risk Evaluation. In s

Expand the Charge Question

Comment 5.2.29

Summary: A public commenter (0053) recommended that EPA expand charge question 7 to specify that the draft intermediate and chronic OEVs were derived from the POD identified using the BMD modeling of Zhang et al. (2017) and presented in Appendix N of the draft risk evaluation. The commenter additionally recommended that the following request be appended to the end of the charge question: "d) Please comment on the derivations of the intermediate and chronic non-cancer occupational exposure values presented by EPA in Appendix N, including the appropriateness of the underlying study/data used and the overall uncertainty factors used."

EPA Response: EPA did not change the charge questions as a result of the comments from Commenter 0053, as EPA felt that charge question 7 was sufficiently broad for the SACC to consider the Zhang et al. (2017) study.

Charge Question 9 – Cancer Assessment

NTP (1978)

Comment 5.2.30

Summary: A public commenter, in multiple submissions to the docket (0052, 0063), stated that EPA is quantifying cancer risk for 1,1-dichloroethane by reading across from 1,2-dichloroethane, even though 1,2-dichloroethane is more potent. However, the commenter said that an alternative approach would be for EPA not to quantify the cancer risk of 1,1-dichloroethane at all, or to use a threshold approach. The commenter said that the Integrated Risk Information System (IRIS) cancer classifications for both 1,2- and 1,1-dichloroethane were performed prior to the 2005 Guidelines for Carcinogen Risk Assessment, when the descriptors for carcinogenic potential were also updated. However, the commenter said that "possible human carcinogen" may be analogous to the 2005 Guideline descriptors of "suggestive evidence of carcinogenic potential" or "inadequate information to assess carcinogenic potential." The commenter said that in practice, they are unaware of EPA conducting any kind of quantitative assessment for "inadequate information." The commenter, along with another public commenter (0066) suggested that the SACC should consider if the data for 1,1-dichloroethane, including limitations of read-across from 1,2-dichloroethane, are sufficient to derive cancer toxicity values via a (linear) dose-response assessment, as a threshold approach, or if the data are sufficient to derive cancer toxicity values at all. A public commenter (0066) also stated that there are significant concerns regarding the extrapolation of the dose response from 1,2-dichloroethane to 1,1-dichloroethane owing to clear differences in potency. Specifically, the commenter, in two submissions to the docket (0066, 0067) said that based on the cancer risk values, the cancer unit risk (inhalation route) value for 1,1-dichloroethane was 13-fold lower than for 1,2-dichloroethane; the cancer slope factor (oral route) for 1,1-dichloroethane was 8-fold lower than for 1,2-dichloroethane; and the cancer slope factor (inhalation route) for 1,1-dichloroethane was 13-fold lower than for 1,2-dichloroethane.

Another public commenter (0062) stated that although concerns have been raised about the age of the NCI (1978) mouse study, an OPPT/Existing Chemicals Risk Assessment Division analysis comparing the NTP study with the current 2018 OECD Combined Chronic Toxicity/Carcinogenicity Studies guidelines did not find differences in the methodology that would have impacted the outcome of the study. The commenter also said that the mice developed tumors both benign and malignant at lower doses than estimated since there was a loss of 1,2-dichloroethane due to volatilization. If anything, the commenter said that a higher incidence of tumors cannot be ruled out with full-strength concentration of 1,2-dichloroethane in the drinking water.

A public commenter (0053) said that EPA and the SACC should carefully consider the utility of the NTP studies for both 1,1-dichloroethane and 1,2-dichloroethane (NCI, 1978; NTP, 1978). For example, for the rat studies, reduced survival due to colony pneumonia may preclude the use of the data from these studies based on both EPA and OECD guidelines for survival, according to the commenter. However, another public commenter (0062) stated that that the pneumonia may be of low confounding impact. The commenter explained that the overall tumor incidence, the organs affected, and the presence of multiple tumors in the NTP (1978) rat study is similar to the results observed in the Nagano et al. (2006) rat study, which was an inhalation study. The commenter concluded that the similarities between

two very different exposure routes strengthen the rationale to use the NTP (1978) rat study in a qualitative manner to support the quantitative derivation of the oral slope factor from the mouse study.

Another public commenter, in multiple submissions to the docket (0066, 0067) stated that, despite the similarities between the two NTP studies in design and execution, EPA considered the 1,2-dichloroethane mouse study to be of sufficient quality for use in subsequent dose response assessment, while the 1,1-dichloroethane mouse study was excluded from consideration for evaluating hazard and dose response of 1,1-dichloroethane. Therefore, the commenter said there is a "logical inconsistency" in the interpretation of this study by EPA, with EPA using the 1,1-dichloroethane NTP study to justify analog identification but considering it insufficient for characterization of 1,1-dichloroethane carcinogenicity. The commenter (0067) said that the Office of Chemical Safety Pollution Prevention and the ORD within EPA disagreed with the Agency's decision that the NTP (1978) study was appropriate for use to characterize 1,2-dichloroethane carcinogenicity. The groups found deficiencies in both NTP (1978) studies including: reduced survival in rats, including controls, due to high incidences of pneumonia; variable dosing regimen in mice resulting in potential challenges with identification of a tumorigenic dose; inconsistency with current guidelines; and quality control concerns.

EPA Response: Read across is a standard process at the EPA when the chemical database is insufficient (*i.e.*, OPPT, PPRTV, etc). There are insufficient mechanistic data to perform a threshold analysis for cancer instead of the default linear model for genotoxic chemicals such as 1,1-dichloroethane. The SACC stated that we should use all studies qualitatively for weight of scientific evidence. EPA is using the 1,1- and 1,2-dichloroethane (NCI, 1978; NTP, 1978) studies qualitatively and not deriving an oral cancer slope factor. Although, a commenter indicated that similarities in effects via inhalation and oral exposure to 1,2-dichloroethane could justify a quantitative derivation of the oral slope factor from the Nagano et al. (2006) study, EPA is not pursuing this derivation due for 1,1-dichloroethane due to a lack of an inhalation study that even qualitatively would suggest similar effects by both exposure routes.

Comment 5.2.31

Summary: The SACC said that they agree with the Health Effects Division (HED) and ORD statements that the NCI (1978) study is "inadequate to draw any conclusions regarding carcinogenicity and should not be considered in the weight of evidence evaluation of carcinogenicity for [1,1-dichloroethane] due to several study limitations," including decreases in survival of the animals. The SACC stated that they agree with both HED and ORD comments that the National Cancer Institute (NCI) (1978) study is "inadequate to use quantitatively or qualitatively to evaluate the carcinogenicity of [1,1-dichloroethane] due to several study limitations, despite the lack of survival issues observed in rats." The SACC stated that since the NCI (1978) study has been reviewed by multiple groups of scientists over time with multiple recommendations that the limitations and uncertainties are too great to draw conclusions regarding the potential carcinogenicity of 1,1-dichloroethane, either qualitatively or quantitatively, the NTP study should not be relied upon to assess the potential carcinogenicity of 1,1-dichloroethane. The SACC recommended that this study can be used, with some caution, in hazard identification, but should not be used at all for dose-response assessment (citing EPA's guidance on systematic review; *i.e.*, uninformative studies may still be used in hazard identification).

EPA Response: EPA has incorporated the NCI (1978) study for 1,1-dichloroethane as part of the hazard identification but not used the study for dose-response assessment.

Comment 5.2.32

Summary: The SACC agreed that the high pneumonia rates in the NTP (1978) 1,2-dichloroethane rat study reduced the ability to infer much from the rat portion of the study because sample sizes were very small. The SACC said that it was impossible to infer what the carcinogenic response would have been if fewer rats had died from pneumonia; however, the surviving animals did continue to suggest a dose-dependent increase in mammary tumors, consistent with other studies. The SACC stated that the NTP (1978) rat study should not have been used for quantitative dose response, however, per EPA's own guidance, it is appropriate to include a discussion of the studies to "qualitatively inform the hazard identification determination and/or weight of the scientific evidence." The SACC said that the current narrative in the draft hazard assessment for 1,2-dichloroethane is too definitive with respect to the evidence that can be gleaned from the NTP (1978) study and should be revised to state that there is some evidence based on the outcomes, but no definitive conclusions can be made due to the confounding by pneumonia and high mortality rates. The SACC said that the results from the NCI (1978) rat study are not suitable for use in dose-response assessment and use in hazard identification is limited, adding that while the results should be discussed, they should be given very little weight in the overall carcinogenic weight of evidence analysis. The SACC said that based on the rating system outlined in EPA's data quality evaluation framework, Metric 22 in the mouse assay should have been given a rating of 3, at a minimum, and per the instructions in the guidance, only the doses unaffected by high mortality from infection could have been used. The SACC said that this scoring would have left only the controls and thus effectively, using this logic, neither study should be used by EPA in the risk evaluation for dose-response assessment.

EPA Response: EPA did not use the 1,1- or 1,2-dichloroethane (NCI, 1978; NTP, 1978) rat studies quantitively in the risk evaluation; however, they were used qualitatively within the hazard identification and overall weight of scientific evidence conclusions. Additionally, SACC using the prior version of guidance for systematic review evaluation (U.S. EPA, 2018) and has since been updated (U.S. EPA, 2021), suggests that the study would have been received a Metric 22 rating of low due to deficiencies or concerns that are likely to have a substantial impact on results. Due to the confounding in the high dose group of mice due to mortality, this cohort of animals were reevaluated and not used for the cancer slope derivation but was still presented in hazard identification and overall weight of scientific evidence. As a result of the comments received EPA did not include the oral cancer slope factor in the draft RE (calculated from the mouse study based on the NCI (1978) study) in the final RE. As a result, oral/dermal cancer for 1,1-dichloroethane could not be assessed in the final RE.

Slope Factor

Comment 5.2.33

Summary: A public commenter (0068) stated that in the 1,1-dichloroethane Draft Risk Evaluation and the 1,2-dichloroethane Draft Hazard Assessment, EPA used a slope factor of 6.2×10^{-2}, obtained from the EPA 1987 IRIS assessment of 1,2-dichloroethane using the NTP (1978) mouse study of 1,2-dichloroethane. However, the final slope factor from the EPA 1987 IRIS assessment was 9.1×10^{-2} based on the NCI (1978) rat study, indicating a cancer risk 50 percent greater than the mouse slope factor. The commenter recommended that EPA use the final slope factor for characterizing risks of 1,1-dichloroethane and 1,2-dichloroethane.

EPA Response: EPA did not use the 9.1×10^{-2} cancer slope factor value as it was based on the rat study from NCI (1978) for 1,2-dichloroethane. This study was confounded by high incidences of pneumonia

which systematic review identified the study as not suitable for dose-response and derivation of a cancer slope factor Furthermore, as per SACC recommendation, a cancer slope factor based on the mouse data from the same study was not derived, due to concerns raised to concurrent pneumonia and mortality in the mice administered 1,2-dichloroethane in the high dose group tested. EPA, therefore, is not presenting a quantitative cancer slope factor from this study that could not be utilized to calculate cancer risks.

Comment 5.2.34

Summary: The SACC said that neither study (NCI, 1978; NTP, 1978) (in either species) is an ideal candidate for dose-response assessment and ultimately, the development of oral cancer slope factors. Considering the issues with both studies, it is unclear why the 1,2-dichloroethane mouse study (NTP, 1978) was selected over the 1,1-dichloroethane mouse study (NCI, 1978), given the issues with pneumonia and mortality were similar and considering that 1,2-dichloroethane is more potent than 1,1-dichloroethane based on metabolism. The SACC said that the NCI (1978) 1,1-dichloroethane studies in both species, while not without limitations, found little evidence of carcinogenicity at low doses. SACC members recommended that it is possible that if carcinogenic, 1,1-dichloroethane is a threshold carcinogen and thus could be assessed with a Reference Dose (RfD) approach that protects against cancer effects based on evaluating doses among non-cancer and cancer studies. The SACC said that the evidence for the carcinogenicity of 1,2-dichloroethane is stronger, but there remain some questions regarding the dose-response curve, and there is some evidence of a threshold response. Given differences in the metabolism of 1,1-dichloroethane and 1,2-dichloroethane and the weaknesses with the NTP studies for both 1,1- and 1,2-dichloroethane, EPA should not use the NTP (1978) 1,2-dichloroethane carcinogenicity to read-across to 1,1-dichloroethane. The SACC said that EPA should consider evaluating an RfD approach for 1,1-dichloroethane or foregoing cancer risk evaluation all together. However, one SACC member noted that the traditional RfD approach does not provide estimates of risk.

EPA Response: EPA did not identify sufficient data to use the RfD approach nor sufficient data to calculate an accurate potency factor. EPA evaluated both 1,1- and 1,2-dichloroethane (NCI, 1978) mouse studies which did not indicate the presence of tumors in the 1,1-dichloroethane mouse study but endometrial polyps, considered pre-cancerous lesions and not suitable for derivation of a slope factor. EPA is using the NCI (1978) and NTP (1978) studies for 1,1- and 1,2-dichloroethane qualitatively and using the Nagano et al. (2006) study for 1,2-dichloroethane quantitatively for inhalation unit risk derivation.

Nagano et al. (2006) and Mode of Action (MOA)

Comment 5.2.35

Summary: A public commenter, in multiple submissions to the docket (0066, 0067), expressed several concerns regarding the dose response methods employed by EPA in determining potential potency for 1,2-dichloroethane from Nagano et al. (2006), including: the selection of endpoint for modeling (*e.g.*, combined mammary and subcutaneous tumors); the applicability of the BMD modeling to the selected endpoint; and the use of linear low-dose extrapolation in light of existing *in vivo* evidence on the potential genotoxicity of 1,2-dichloroethane and recent studies investigating potential MOAs for 1,2-dichloroethane. First, the commenter said that EPA determined that the highest inhalation unit risk estimate for 1,2-dichloroethane was based on the findings in Nagano et al. (2006) of increased incidences of subcutaneous fibromas and mammary gland adenomas, fibroadenomas, and adenocarcinomas in female rats exposed to 1,2-dichloroethane. However, the commenter said that

control animals demonstrated mammary gland tumors at incidence rates that either exceeded or did not statistically differ from those reported for 1,2-dichloroethane-exposed animals. This was true for all doses except the highest 1,2-dichloroethane dose tested, according to the commenter. In addition to concerns about the appropriateness of the endpoint upon which EPA based their inhalation unit risk estimate for 1,2-dichloroethane, the commenter said that this endpoint may not be suitable for the BMD modeling EPA used to predict potency. The commenter recommended that EPA provide an expanded rationale for modeling the combination of the mammary gland tumors with the subcutaneous tumors. The commenter said that a review of the Nagano et al. (2006) data and BMD modeling results indicate that modeling the combined mammary gland tumors without the addition of the subcutaneous tumors is a more appropriate approach. Finally, the commenter said that EPA used a linear extrapolation approach to the tumor data from Nagano et al. (2006), which is uncertain, since there is evidence indicating 1,2-dichloroethane may act through a non-mutagenic MOA for carcinogenesis. The commenter suggested using a non-mutagenic threshold instead. Similarly, in evaluating carcinogenicity, a public commenter (0053) recommended that EPA and the SACC consider both 1) other potential MOAs for 1,2-dichloroethane and 2) whether genotoxicity data for 1,1-dichloroethane warrants a linear low dose extrapolation assumption. Similarly, two public commenters (0059, 0078) also suggested that the SACC carefully assess the MOA and its implications for the development of screening values.

EPA Response: EPA used the Multistage/Multi-tumor model as all the tumors were considered adverse and independent of each other. The purpose of Multistage/Multi-tumor Combo model in BMDS is to allow the user to calculate BMDs and BMDLs for a combination of tumors (corresponding to a defined risk of getting one or more of those tumors) when the individual tumor dose-responses have been modeled using a Multistage-Cancer model. Thus, the output of the run will present the results of fitting each individual tumor (including the BMD and BMDL for that tumor) plus the combined log - likelihood, BMD, and BMDL for the combination of specified tumor responses. BMD modeling of the combined tumor incidences in female rats was performed as the incidences of the mammary tumors and subcutaneous fibromas showed a significant positive trend with increased concentration and were significantly different from the control group at 160 ppm (combined mammary tumors were also significantly different from controls at 40 ppm). The incidences of mammary tumors in the control group were at incidence rates (16%) that did not exceed the maximum tumor incidences when compared to historical controls (20%) and thus retained in the modeling for comparison to the incidence rates of 16, 22, and 50 percent in female rats treated with 10, 40, and 160 ppm of 1,2-dichloroethane, respectively. Nagano et al. (2006) also concluded that the highest tested dose did not exceed the maximum tolerated dose thus the top dose is relevant for the analysis. EPA used the linear low dose of the curve to calculate the slope factor. EPA did not identify sufficient data to determine if 1,2-dichloroethane acts through a mutagenic MOA for carcinogenicity.

Comment 5.2.36

Summary: The SACC agreed with both HED and ORD that the Nagano et al. (2006) study "is of high quality and that data are sufficient for use in the weight of evidence for evaluating 1,2-dichloroethane carcinogenicity, despite the lack of individual animal data." The SACC said that while the Nagano et al. (2006) study should be of adequate quality to conduct a quantitative assessment to develop an Inhalation Unit Risk (IUR) for 1,2-dichloroethane, there are remaining questions about the dose response relationships of other tumor types based on visual observations of the tumor counts at each dose and the concerns with Peto's test for both species but particularly for rats given mortality was low. The SACC suggested that EPA should attempt to obtain the raw individual animal data and re-run trend tests via the Poly-3 method or other trend test to confirm dose-response relationships. The SACC stated that two other studies showed no evidence of cancer at the exposures assessed – the inhalation study by Maltoni

et al. (1980) was ranked as uninformative in the risk evaluation, but Cheever was ranked as high quality. The SACC said that there is no discussion of Maltoni et al. (1980) outside of the tables in the risk evaluation generally, and it appears the hazard identification weight of evidence evaluation for carcinogenicity is incomplete.

EPA Response: As the SACC suggested, EPA attempted to obtain the raw individual animal data for the Nagano et al. (2006) study from the authors but was unsuccessful and was therefore unable to rerun an analysis to confirm the dose-response relationships. Additionally, EPA has incorporated narrative regarding the Maltoni et al. (1980) and Cheever et al. (1990) studies as part of the weight of scientific evidence regarding cancer via the inhalation route.

Comment 5.2.37

Summary: The SACC said that the Nagano et al. (2006) should be of adequate quality to conduct a quantitative assessment to develop an IUR for 1,2-dichloroethane. However, using read-across to extend this to 1,1-dichloroethane is dependent upon addressing the recommendations of the SACC for Charge Question 3 regarding the current read-across approach.

EPA Response: EPA did not identify a cancer study via the inhalation route for 1,1-dichloroethane that was sufficient for dose-response and calculating inhalation unit risk. As per the recommendation by the SACC in using qualitative data in hazard identification. EPA identified similar tumor types in 1,1- and 1,2-dichloroethane based on evaluation of the NCI (1978) and NTP (1978) oral studies for both chemicals, as well as those identified in the Nagano et al. (2006) inhalation study. Thus, these data support the read-across approach and Nagano et al. (2006) is considered protective for 1,1-dichloroethane via the inhalation route.

Age-Dependent Adjustment Factors (ADAFs)

Comment 5.2.38

Summary: A public commenter (0068) stated that apply should apply ADAFs when calculating cancer risks to the general population, as required under EPA guidelines, for chemicals that are mutagenic. The commenter said that failure to apply ADAFs will result in underestimation of risks and would be inconsistent with the best available science.

EPA Response: EPA did not identify data to indicate that mutagenic mode of action for 1,1- or 1,2-dichloroethane and thus a derivation of an age-derived adjustment factor (ADAF) for 1,1- or 1,2-dichloroethane was not applied for the risk estimates for the general population.

Expand the Charge Question

Comment 5.2.39

Summary: A public commenter (0053) suggested that EPA expand charge question 9 to include information on the Nagano et al. (2006) rat inhalation study of 1,2-dichloroethane which was used for BMD modeling to derive an IUR, which forms the basis of the draft cancer OEV presented by EPA in Appendix N. The commenter also recommended that additional language be added to the request in part d) of the charge question, stating, “Please also comment on the derivation of the draft cancer occupational exposure value using the [IUR] from the Nagano et al. (2006) study, and presented in

Appendix N of the draft risk evaluation, including the use of the linear low dose extrapolation approach."

EPA Response: EPA did not change the charge questions as a result of the comments from Commenter 0053, as EPA felt that charge question 9 was sufficiently broad for the SACC to consider the Nagano et al. (2006) study.

Selection of 1,2-Dichloroethane as an Analog

Comment 5.2.40

Summary: The SACC said that in considering its recommendations for Charge Question 3, the use of 1,2-dichloroethane as an analog is subject to uncertainties related to potential differences in absorption, distribution, metabolism, and elimination (ADME) and dose-response relationships. The SACC stated that both HED and ORD caution against using this analog approach based on the different ADME behaviors of two isomers and the differences in toxicity profiles (1,2-dichloroethane is more potent). The SACC said that HED and ORD recommended that EPA conduct additional quantitative structure activity relationship analyses to justify whether the two compounds should be bridged. Otherwise, since the carcinogenicity data are poor for 1,1-dichloroethane, the SACC said that an updated study may be required unless EPA wishes to characterize the carcinogenicity risks from 1,2-dichloroethane as being protective of exposure to 1,1-dichloroethane.

EPA Response: It is beyond the scope of this risk evaluation to request an updated study to evaluate carcinogenicity for 1,1-dichloroethane. EPA acknowledges that although there are differences in the ADME profiles for both chemicals, similar reactive intermediate metabolites were identified. Due to limited data for 1,1-dichlorethane, EPA's approach for selection of 1,2-dichloroethane as the analog is thus being applied to the 1,1-dichlorethane risk evaluation to be protective of exposure to 1,1-dichloroethane.

Charge Question 11 – Data Quality Evaluation Criteria

Comment 5.2.41

Summary: Two public commenters (0059, 0067) said that the findings of the extended one-generation reproductive toxicity study call into question the hazards upon which the Agency based PODs for their sub-chronic and chronic toxicity benchmarks for oral and inhalation routes of exposure.

A public commenter, in multiple submissions to the docket (0053, 0066, 0067), stated that the extended one-generation reproductive toxicity study for 1,2-dichloroethane exposure in drinking water by WIL Research (2015) does not indicate impairment of reproduction associated with 1,2-dichloroethane exposure. The commenter (0053) stated that EPA's dismissal of this study was inappropriate and requested that the SACC consider the implications of excluding drinking water studies to support prediction of effects of inhalation exposure.

EPA Response: All studies identified by EPA were subjected to the systematic review process and any inadequacies identified that preclude the use of the study for dose response have been acknowledged in the Draft Risk Evaluation and the final Risk Evaluation within the hazard identification. EPA evaluated the use of the WIL Research (2015) study and concluded it was not suitable for quantitative dose response analyses This drinking water study had multiple concerns for dosing accuracy, fundamental to toxicology. There were high rates of chemical evaporation and water spillage was not quantified,

making the doses highly uncertain with low confidence in the results. EPA did consider the results of the WIL Research (2015) study qualitatively in the hazard identification and weight of evidence evaluations as recommended by the SACC.

Comment 5.2.42

Summary: The SACC agreed that there is concern that the body weight loss from palatability may have affected the study results. One SACC member "noted that the loss of body weight has implications for many other endocrine and reproductive functions. As mentioned in the study report, there were detectable changes in some of the reproductive hormones in treated groups, and there is some uncertainty regarding the cause of these changes. The study report largely concluded that the palatability issues did not affect results," but there was some concern from at least one SACC member that "observed effects were improperly discounted, and thus remaining uncertainty regarding the usefulness of the study for hazard characterization."

Additionally, The SACC said that they were concerned that this study was one of just a few studies evaluating this endpoint. The SACC said that "in contrast to those that were not excluded, it reported no significant treatment-related effects at the ingested doses. Moreover, the goal of this study and the consent order was to gather data for EPA that could be used with pharmacokinetic data to conduct route-to-route extrapolation from the oral to the inhalation route of exposure." The SACC expressed concern that a test requested by and designed for EPA's program was excluded from the risk evaluation, even for hazard identification.

The SACC provided several recommendations:

- "Review Uncited Paper about the WIL Research (2015) study: EPA should review and include the results of the analysis by Sweeney and Gargas (2016), which was not cited in the draft risk evaluation.
- Reassess the uninformative rating: EPA should re-evaluate the WIL Research (2015) study, in light of the SACC's comments and after considering the Sweeney and Gargas (2016) analysis. EPA should consider whether the overall study rating should be changed given the preceding comments on the uninformative rating generally and also explicitly in light of the other strengths of the study.

Provide summary: Even if EPA chooses to keep the uninformative rating for the WIL Research (2015) study, EPA should provide a summary of the findings of this study because it is an important study for evaluating potential reproductive and developmental hazards."

EPA Response: EPA has further evaluated and incorporated the WIL Research (2015) study into the hazard identification and weight of scientific evidence narrative. Additionally, EPA also further outlined the uncertainties and limitation of this study that precluded its use for dose-response. Furthermore, EPAEPA incorporated the considerations regarding the Sweeney and Gargas (2016) analysis for route-to-route extrapolation from the oral to inhalation routes *in lieu* of using inhalation studies that were since identified via systematic review.

Charge Question 12: Information Rated "Uninformative"

Comment 5.2.43

Summary: A public commenter, in multiple submissions to the docket (0059, 0078), stated that the studies deemed "uninformative" by EPA, including Munson et al. (1982) and NTP (1991), may provide

important weight of evidence considerations regarding hazard potential for 1,2-dichloroethane, as well as important dose response information that could critically alter conclusions reached by EPA in their hazard assessment for 1,2-dichloroethane. A public commenter (0053) requested that the SACC consider the study quality and applicability of Munson et al. (1982) and consistency of results across treatment regimens, including: the consistency of findings of immunotoxicity across dosing regimens; the relevance of the NOAEL of the drinking water study; and the relevance of the immunotoxic effect observed in the 14-day gavage study.

Two public commenters (0053, 0059) said that ATSDR relied on NTP's drinking water study for derivation of their intermediate minimum risk level. Therefore, one of the commenters (0059) said that the Agency's decision to exclude these studies may not be appropriate and/or justifiable. Another public commenter (0069) discussed the NTP (1991) drinking water study and said that the inclusion of the study would not impact the derivation of oral noncancer short-term and long-term chronic PODs, since the immunosuppressive effects identified in Munson et al. (1982) reflect the more sensitive endpoint. However, the commenter said that the NTP drinking water studies are important for the weight of evidence determination of renal effects from 1,1- and 1,2-dichloroethane exposure. The commenter went on to state that EPA should change its rating of Metric 21 to "Low" based on the reduction in water intake due to palatability issues and the study assessment of which effects were potentially affected by dehydration. A public commenter (0053) requested that the SACC consider the study quality and applicability of NTP (1991) and consistency of results across treatment regimens.

Another public commenter (0068) suggested that EPA should revise its "uninformative" rating for the NCI (1978) rat study.

The SACC stated that it may be appropriate to exclude all uninformative studies from use for quantitative risk assessment, but that these studies should not be wholly excluded from the hazard identification process. Rather, the SACC recommended that "EPA include all studies in the qualitative weight of evidence evaluation for hazard identification." The SACC stated that this is consistent with the 2021 Draft Protocol for Systematic Review in TSCA Risk Evaluations. The SACC said that the draft risk evaluation does not sufficiently describe or justify in cases where the uninformative studies were excluded from hazard identification, that the study deficiencies were serious enough that they were not informative at all to the overall weight of evidence for that endpoint. The SACC also recommended that "at a minimum, EPA provide short summaries of the results of all studies identified for a given endpoint, including the identified methodological flaws, and, where justified, clearly state why the deficiencies in the study limited the study's use in the overall weight of the scientific evidence."

The SACC also expressed concerns regarding the process in which EPA TSCA data quality evaluation yields "uninformative" ratings. The SACC said that rating studies as uninformative based on a single criterion is problematic. Several members of the SACC also expressed concerns that the single-criterion approach may allow unjustified exclusion of studies that were otherwise high quality and demonstrated a lack of toxicity following chemical exposure. The SACC stated that this is readily apparent, for example, with the WIL Research (2015) one-generation reproductive study, in which nearly all of the 22 data quality metrics were rated as "high" with the exception of one rated critically deficient based solely on reduced water consumption and associated body weight loss.

The SACC provided EPA with several recommendations:

- "Include All Studies in Hazard Identification: Incorporate uninformative studies into the qualitative weight of evidence evaluations to ensure comprehensive hazard identification."

- "Reassess Uninformative Ratings: Revisit the methodology for designating studies as uninformative, potentially eliminating the single-criterion approach in favor of a more holistic evaluation considering cumulative quality."

"Adopt Tiered Evaluation: Consider adopting a tiered study rating system to provide balanced assessments of study quality that also facilitate assigning more weight to the overall rating for the most influential study domains."

EPA Response: Studies identified as uninformative/not suitable for dose response were still evaluated by EPA with regards to qualitative hazard identification as suggested by the SACC, if the study was able to be incorporated in the weight of scientific evidence based on suggestive causality between exposure and health effects identified in the study. If too many uncertainties regarding the methodology of the study were identified or limitations in the data reporting, these studies were described to clarify the rationale for exclusion from evidence integration for the corresponding health effects. Accurate dosing is a fundamental parameter for dose response analysis in toxicology, if there were great concerns in dosing, then a study can obtain an uninformative for dose response systematic review score for quantitative dose response, due to the lack of confidence in this critical parameter.

Other Comments on the Human Health Hazard Assessment Not Specific to the Above Charge Questions

Comment 5.2.44

Summary: A public commenter (0078) stated that the tools EPA relied on to determine analogs for 1,1-dichloroethane produce many potential analogs, and EPA's decision methodology for identifying and selecting appropriate analogs was not clearly described. The commenter suggested that EPA should consider alternate approaches to identifying analogs for 1,1-dichloroethane, such as relying on a categorical approach or use of data for a more structurally similar germinal dihalide such as dichloromethane.

EPA Response: The human health and ecological hazard assessments used similar processes for analog selection by using scores from publicly available tools to consistently rank the analogs. The ECOSAR model, which is targeted for ecological information, was used for the ecological hazard assessment but not the human health hazard assessment. Details on the analog selection processes have been moved from an appendix to the main body of the risk evaluation (Section 5.2.1.3). In consultation with ORD publications and staff, EPA selected the analogs based on tool results and analogs with the best available information to fill data gaps which varied from human health and ecological disciplines. There currently is no TSCA Chemical Category for chlorinated solvents that can be applied for this risk evaluation. Physical and chemical properties, structure and metabolism were important considerations in analog selection. 1,2-Dichloroethane has an identical molecular weight, two carbons and forms a chloroaldehyde like 1,1-dichloroethane with common concerns for persistent DNA crosslinking. And dichloromethane has a much lower similarity score than 1,2-dichloroethane in the OECD QSAR Toolbox results.

Section 5.3 – Human Health Risk Characterization

EPA Dismisses Risk to Fenceline Communities

Comment 5.3.1

Summary: A public commenter (0062) stated that in its assessment of risks to the general population from releases of 1,1-dichloroethane into the environment, EPA calculated cancer risks above benchmarks for every condition of use except commercial use as a laboratory chemical particularly from inhalation of 1,1-dichloroethane. But the commenter said that EPA dismissed these calculations of risk with a problematic land use analysis and an incomplete aggregate analysis. For example, the commenter said that EPA conducted a review of land use patterns near TRI facilities where cancer risk exceedances occur. However, EPA said the review was "limited to those facilities with real Global Information System (GIS) locations [and] does not include generic facilities where alternative release estimates were modeled to estimate exposures since there is no real location around which to conduct the land use analysis." A public commenter (0069) stated that despite this admission, EPA still found that those conditions of use that it was unable to conduct land use analyses for, do not contribute to any unreasonable fenceline risks. Commenter (0062) asserted that disregarding exposures from modeled estimates because there is no specific location discounts the risks found to real communities at real locations where these exposures might occur – especially if facilities begin operating under these conditions of use in the future. Additionally, the commenter (0062) said that EPA did not consider potential future residential use of empty areas near facilities. Based on this analysis, the commenter said that EPA did not find any residential, industrial/commercial businesses, or other public spaces within 1,000 meters where risk estimates would exceed benchmarks, and concluded they do not expect a risk to the general population resulting from 1,1-dichloroethane releases via the ambient air pathway. The commenter asserted that this analysis fails to consider the reasonably foreseen circumstance that land use can change over time (*e.g.,* due to increasing cost-of-living in urban centers). A public commenter (0068) said that given the current uncertainty in pinpointing TRI emissions sources, EPA cannot conclusively determine that residents of fenceline communities are not within 1,000 meters of a polluting facility without incorporating a larger buffer to account for precision errors. Therefore, EPA should not minimize, or disregard estimated risks based solely on the single land use assessment. Another public commenter (0069) said that EPA cannot assume that no one will move or build houses closer to facilities that present unreasonable risk, and it is "reasonably foreseen" that these areas may look different in the future. Another public commenter (0064) also discussed EPA's land use analysis and said that though facilities may be adjacent to "uninhabited" areas, those areas could be used by tribal hunters, gatherers, and fishers, as well as farmers, recreational hunters, and boaters. The commenter said that land use analysis that limits itself to human population density as a metric of general population risk misses potential uses by humans and wildlife alike.

The other commenter (0062) said that this approach is problematic given EPA's intention to make unreasonable risk determinations on specific conditions of use, which results in EPA deeming that specific conditions of use of 1,1-dichloroethane do not pose a risk to fenceline communities due to land use patterns at this moment in time and uncertainty in emissions locations. Also, EPA's air emissions analysis contradicts its land use analysis, as it found that 4 out of 10 TRI sites had populations within proximity to the release sites that may experience high-end exposures including childcare centers and public schools, according to the commenter.

EPA Response: All the assumptions and uncertainties related to land use analysis are stated in the risk evaluation in Section 5.3.3.2.1. EPA acknowledges that land use patterns may change over time, but reasonably available information does not indicate that changes to land use patterns in these particular areas are reasonably foreseen, as opposed to speculative and unsubstantiated. Consistent with TSCA

section 6(b)(4)(F)(iv), EPA's land use analysis takes into account the likely duration, intensity, frequency, and number of exposures under the conditions of use. Also, as stated in Section 5.3.3.2.1, the land use analysis was limited to those facilities with real Global Information System (GIS) locations and does not include generic facilities where alternative release estimates were modeled to estimate exposures since there is no real location around which to conduct the land use analysis. For the four TRI facilities that commenter 0062 references, EPA's land use analysis did not identify any residential, industrial/commercial businesses, or other public spaces within those 1,000 m where risk estimates would exceed 1×10^{-6}. EPA considers the land use analysis (Section 5.3.3.2.1) to be more certain than population analysis described in Section 5.1.2.2.3. Therefore, EPA does not expect a risk to the general population resulting from 1,1-dichloroethane releases via the ambient air pathway.

Comment 5.3.2

Summary: A public commenter (0062) also discussed EPA's analysis of aggregate risk within the air pathway, which found that 13 out of 23 facilities were neighboring other facilities releasing 1,1-dichloroethane. However, the commenter said that EPA concluded that this analysis "did not identify locations with cancer risk greater than 1×10^{-6} that did not already have cancer risk above that level from an individual facility." The commenter noted that the point of assessing aggregate exposures is not merely to identify whether a particular community is above or below a 1×10^{-6} cancer risk, but rather to determine the full extent of the risks to the communities that are exposed to 1,1-dichloroethane from multiple sources. The communities that experienced unreasonable cancer risks from an individual facility experience even greater risks when aggregate exposures are considered, and it is those combined risks that must drive EPA's risk characterization and risk management, according to the commenter. Additionally, the commenter said that EPA must aggregate risk across all exposure routes, such as oral, inhalation, and dermal. Finally, the commenter said that EPA's dismissal of risk if contrary to TSCA's mandates to utilize best available science and to assess risk to PESS.

A public commenter (0068) said that while they support EPA's decision to examine aggregate exposure resulting from releases from multiple TRI facilities, EPA failed to apply the same methodology to National Emissions Inventory (NEI) facilities and failed to aggregate fenceline and worker exposures. The commenter said that the SACC already raised these concerns in its evaluation of the Fenceline Assessment Approach, and suggested that EPA consider "multiple source exposures, aggregate exposures, and double aggregate and occupational exposures from workers living near and working at the facilities" where chemicals like 1,1-dichloroethane are released.

A public commenter (0069) said that EPA failed to address the SACC's criticisms of its fenceline assessment methodology by understating fenceline communities' cumulative exposures and risks from multiple and aggregate sources.

EPA Response: In the risk evaluation, a conservative screening method for aggregated risk within the air pathway was included to address whether the combined general population exposures to emissions from nearby facilities present any additional risk not represented by the individual facility analysis (Appendix D.4 of the Risk Evaluation). In this analysis, EPA aggregated exposures without consideration of land use. The purpose of the aggregate analysis in this risk evaluation was to identify if multiple facilities in proximity of each other and releasing 1,1-dichloroethane would result in higher risk to surrounding communities relative to risks due to a single facility. While there were higher risks when aggregating exposures compared to risk from a single facility, the aggregate analysis did not result in additional risks above the cancer benchmark of 10^{-6} that were not already identified through analysis of individual facilities.

EPA's land use analysis did not identify any residential areas within 1,000 m where risk estimates would exceed 1×10^{-6}. Therefore, EPA did not conduct an aggregate analysis of inhalation exposures from workers living near and working at the facilities.

EPA did not conduct an aggregate exposure analysis across all routes in this risk evaluation. EPA conducted route-to-route extrapolation of toxicity values from oral studies for use in dermal exposure routes and scenarios. Since there are different health outcomes from oral and inhalation studies, EPA did not consider it possible to aggregate risks across exposure routes for all exposure durations and endpoints for the selected PODs.

EPA did not include aggregate analysis for NEI releases in this risk evaluation because EPA had high confidence the aggregated risk would not present any additional risk not represented by the individual facility analysis. Since facilities with the highest releases are captured in both NEI and TRI data, aggregating NEI facilities would not change the risk conclusion.

Comment 5.3.3

Summary: To address the potential underestimation of risk due to critical methodological flaws in the fenceline assessment approach, one of the public commenters (0068) said that EPA should more comprehensively account for fenceline community risk by making easily implemented revisions to its fenceline analysis. For example, the commenter suggested that EPA could use existing chemical release data, and the same models and information included in the fenceline analysis to better account for all relevant 1,1-dichloroethane exposure routes, pathways, and combinations thereof in fenceline communities. The commenter also recommended that EPA apply an expanded intra-species adjustment factor of 42×, consistent with the 42-fold human variability in toxicokinetic and toxicodynamic responses to chemical exposures observed by the WHO using a probabilistic method. Application of this expanded adjustment factor will more adequately capture human variability in the response to 1,1-dichloroethane exposures, according to the commenter.

EPA Response: EPA considered inhalation risks for communities living near releasing facilities. EPA conducted a land use analysis to determine at what distance from a releasing facility that members of the general population were likely to live and work.

EPA's land use analysis did not identify any residential areas within 1,000 m where risk estimates would exceed 1×10^{-6}. While there are inherently uncertainties in this evaluation, EPA had high enough confidence in the methodology to make its final risk determination. Releases reported to TRI capture start-up, shutdown and malfunction events (SSM). While SSMs may result in higher than usual releases, averaging releases across a release period of 250 to 365 days a year results in exposures calculations that are representative of the most likely exposures. EPA did not consider exposures to people who both work at and live near facilities releasing 1,1-dichloroethane since EPA does not have data showing that this is a likely exposure scenario. Further, when calculating lifetime exposures for the general population, EPA assumed continuous exposure over a 78-year lifespan, which should account for people who both live and work near releasing facilities. Risk for workers at releasing facilities are assessed in Section 5.3.3.1. EPA will consider conducting aggregate inhalation exposures from NEI reported releases for future risk evaluations; however, for this evaluation, EPA had high enough confidence in its aggregate analysis to make its final risk determination.

EPA is not using a probabilistic approach for calculating intra-species adjustment factors in risk evaluations under TSCA, which is the basis for the suggested 42× adjustment factor. EPA is in the early stages of research associated with developing probabilistic methods and guidance for use in human health hazard assessment. Until this research is matured and completed, EPA will continue to use the

long-standing, vetted approaches described in existing EPA guidance documents for using default values (U.S. EPA, 2002) and for developing refined values (*e.g.,* 2014 Guidance for Applying Quantitative Data to Develop Data-Derived Extrapolation Factors for Interspecies and Intraspecies Extrapolation; (U.S. EPA, 2014)).

Risks to Other PESS

Comment 5.3.4

Summary: Two public commenters (0062, 0069) stated that EPA failed to adequately consider 1,1-dichloroethane's risks to other PESS. For example, the commenters said that EPA failed to account for 1,1-dichloroethane's increased risk to smokers and to others who are exposed to secondhand smoke. One of the commenters (0069) stated that while TSCA excludes "tobacco or any tobacco product" from the definition of "chemical substance," smoking and exposure to second-hand smoke still contribute to overall 1,1-dichloroethane exposures and make people more susceptible to harm from 1,1-dichloroethane's conditions of use. The commenter also said that EPA recently recognized its obligation to consider background exposures from "non-TSCA" uses. Yet, despite identifying smokers and their families as PESS, the commenter said that EPA failed to quantify their increased exposures and risks. The commenter also said that EPA failed to address 1,1-dichloroethane's increased risks to people with an ALDH2 mutation that renders them more susceptible to cancer, cardiovascular harm, and other serious harms. The commenter recommended that, to the extent EPA lacks sufficient data to quantify the increased risks to this subpopulation, such as the lack of studies in mice models with the ALDH2 mutation, EPA should apply a modifying factor to ensure that its risk calculations are protective of PESS.

Two public commenters (0062, 0068) expressed that EPA improperly assessed risks to PESS qualitatively via the 10× intraspecies uncertainty factor. One of the commenters (0068) stated that WHO and other authoritative bodies have demonstrated that the traditional 10× uncertainty factor does not fully account for risk in sensitive groups. The other commenter (0062) recommended that EPA assess risks to distinct groups of PESS separately by analyzing exposure, dose-response data, and modifying factors specific to each group.

EPA Response: TSCA requires that the determination of whether a chemical substance presents an unreasonable risk include consideration of unreasonable risk to "a potentially exposed or susceptible subpopulation (PESS) identified as relevant to the risk evaluation" by EPA. TSCA § 3(12) states that "the term 'potentially exposed or susceptible subpopulation' 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." For each chemical undergoing a risk evaluation, EPA evaluates the potential for unreasonable risks to PESS under specific conditions of use relevant for general populations, consumer exposures and subsets of occupational exposures/workers.

EPA listed the specific exposures and/or biological susceptibilities considered in the 1,1-dichloroethane assessment in Section 5.3.2 of the final risk evaluation. EPA identified several factors, including smoking as a lifestyle factor that may contribute to a group having increased exposure or biological susceptibility. These factors and the corresponding 1,1-dichloroethane exposures or biological susceptibilities are listed in Table 5-56, which also outlines uncertainties that apply to these subpopulations based on the assumptions considered EPA, for instance, is applying a UFH of 10×,

which is the default value the Agency uses unless data are identified that would warrant an adjustment and further refinement.

Volatilization

Comment 5.3.5

Summary: A public commenter (0069) stated that EPA did not evaluate risks associated with 1,1-dichloroethane's volatilization, which can increase inhalation exposures in communities surrounding landfills, water bodies, and other sites. The commenter said that EPA routinely evaluates the risks associated with pesticide volatilization under the Federal Insecticide, Fungicide, and Rodenticide Act, including risks to communities surrounding the fields where volatile pesticides are applied. Therefore, the commenter said that there is no basis for EPA to ignore that same exposure pathway under TSCA. Additionally, the commenter said that communities where 1,1-dichloroethane is present in the soil or groundwater are also potentially exposed from soil vapor intrusion, or the migration of chemical vapors from contaminated environmental media through the soil and into overlying buildings. The commenter said that EPA must evaluate the risks from ongoing disposal in its final risk evaluation.

EPA Response: EPA investigated reported emissions to air of 1,1-dichloroethane from non-hazardous landfills and determined that these emissions were not due to TSCA COUs of 1,1-dichloroethane. EPA therefore did not evaluate risks associated volatilization of 1,1-dichloroethane from either hazardous or non-hazardous landfills. EPA also investigated the possibility of vapor intrusion and determined that it was not a likely exposure pathway given the estimated groundwater concentrations (Section 3.3.2). Further EPA did not identify any literature showing that continuing disposal of 1,1-dichloroethane is causing risk from vapor intrusion.

Section 6 – Unreasonable Risk Determination

Comment 6.1

Summary: A public commenter (0068) stated that EPA failed to apply a consistent approach to making unreasonable risk determinations. The commenter stated EPA has typically determined whether a condition of use for a particular chemical contributes to unreasonable risk through comparison to benchmark values. In the risk evaluation, EPA stated that "a calculated [margin of exposure (MOE)] that is less than the benchmark MOE is a starting point for supporting a determination of unreasonable risk of injury to health, based on non-cancer effects. Similarly, a calculated cancer risk estimate that is greater than the cancer benchmark is a starting point for supporting a determination of unreasonable risk of injury to health from cancer." The commenter said that this interpretation of MOE is significantly different from what was stated in previous TSCA risk evaluations. For example, in the 2023 draft supplement to the risk evaluation for 1,4-dioxane, EPA stated that the MOE estimate is interpreted as indicating a human health risk if the MOE estimate is less than the benchmark MOE. The commenter stated that while EPA has not disregarded calculated risk from the high-end estimates as it did in the di-isodecyl phthalate (DIDP) and formaldehyde risk evaluations, EPA does suggest potentially only relying on central tendency estimates. The commenter stated that it is imperative that EPA adopt a more transparent and consistent approach to risk quantification and unreasonable risk determination.

Another commenter (0063) stated the proposed determination of unreasonable risk for the assessed conditions of use is unfounded.

EPA Response: EPA has used the MOE approach in previous risk assessments and recognizes that there are numerous ways to characterize risk, of which the interpretation of the calculated MOE to the benchmark MOE is just one. It is important to emphasize that these calculated risk estimates alone are not "bright-line" indicators of unreasonable risk, and additional factors are considered other than whether a risk estimate exceeds a benchmark. Additionally, the unreasonable risk determinations consider chemical-specific information and risk related factors, including how the central tendency and high-end risk estimates best represent each COU, confidence in the information used to inform the exposure values, the nature of the hazard, and relevant uncertainties. EPA strives to implement transparent and consistent approaches in the TSCA section 6 risk quantification and risk determination but recognizes that each assessment will also be developed for suitability on a chemical-by-chemical basis.

Comment 6.2

Summary: A public commenter (0069) stated that despite failing to consider multiple risks due to exposure to PESS, EPA calculated risks to fenceline communities exceeding EPA's unreasonable risk benchmarks, but arbitrarily concluded that 1,1-dichloroethane presents no unreasonable fenceline community risks.

EPA Response: EPA analyzed reasonably available information to ascertain whether some human subpopulations may have greater exposure and/or susceptibility than the general population to the hazard posed by 1,1-dichloroethane. For the 1,1-dichloroethane draft risk evaluation, EPA identified the following PESS groups: infants exposed to drinking water during formula bottle feeding, subsistence and Tribal fishers, individuals with pre-existing conditions such as chronic kidney disease, workers, people with the aldehyde dehydrogenase-2 polymorphism, lifestyle factors such as smoking cigarettes or secondhand smoke, and fenceline communities who live near facilities that emit 1,1-dichloroethane (see

Section 5.3.2, Table 5-49). EPA disagrees with the commenter's statement relating to risk to fenceline communities. As described in Appendix E.3 of the draft risk evaluation and Section 5.3.3.2.1 in the final risk evaluation, EPA further analyzed land use patterns around a few facilities with potential unreasonable risk from ambient air inhalation to the general population and determined no fenceline communities were reasonably anticipated within that distance that potentially presented unreasonable risk.

Comment 6.3

Summary: The SACC noted that distinguishing between chronic exposure and acute exposure is important in the Executive Summary at Lines 1112-1115 related to the unreasonable risk to the environment, but that these lines imply that acute exposure at any concentration is not lethal.

EPA Response: In the final risk evaluation, EPA revised its unreasonable risk determination as relates to risk to the environment and revised the Executive Summary. EPA agrees with the commenter that there may exist a concentration of 1,1-dichloroethane that would be acutely lethal. However, EPA disagrees with the commenter's interpretation of the language in the draft risk evaluation Executive summary because no concentration that high is expected to occur under the scenarios outlined in the risk evaluation. The environmental risk assessment is based on reasonably available data as described in Section 4 of the Risk Evaluation.

Section 7 – Systematic Review

Comment 7.1

Summary: A public commenter (0068) stated that EPA relied on a systematic review methodology that is not consistent with best practices, violating TSCA's "best available science" requirement. The commenter said that both documents relied on systematic review methods that lacked transparency and inappropriately excluded toxicity studies without scientific justification. According to the commenter, the National Academies of Sciences, Engineering, and Medicine (NASEM) recommended the use of existing systematic review methods and improved approaches for TSCA risk evaluations in 2021, and EPA has still not implemented most of these recommendations, and the SACC also recommended best practices in systematic review to the Agency in multiple reports. The commenter suggested that EPA should prepare a new TSCA systematic review methodology that is aligned with the best available scientific methods and issue updated draft systematic review protocols for all risk evaluations currently in development, including 1,1-dichloroethane and 1,2-dichloroethane.

Additionally, the commenter said that EPA hasn't released a systematic review protocol for 1,2-dichloroethane even though it has released many other supplemental materials to the docket. The commenter said that this means that EPA has employed methods in preparing the 1,2-dichloroethane Draft Hazard Assessment that have not been disclosed to the public or to the SACC, and it is unclear why EPA has withheld the protocol. The commenter suggested that EPA should conduct an additional public comment period and panel peer review of the 1,2-dichloroethane hazard assessment documents following the release of the 1,2-dichloroethane systematic review protocol.

The commenter also stated that the search for peer-reviewed and gray literature relevant references for 1,1-dichloroethane was completed in 2019 and hasn't been updated since. The commenter said that population, exposure, comparator, and outcome (PECO) statements play a critical role in conducting a systematic review as they provide criteria for screening the literature search results to identify which studies are relevant and not relevant. The commenter said that the 1,1-dichloroethane draft risk evaluation does not provide the PECO statement that was used to identify relevant epidemiology and toxicology studies, but instead cites EPA's broader 2021 TSCA Draft Systematic Review Protocol. The commenter said that two different PECO statements were provided for both 1,1- and 1,2-dichloroethane in the 2021 TSCA Draft Systematic Review Protocol, both of which EPA has never revised to address public comments and SACC recommendations.

Finally, the commenter commented on the health effects study quality evaluation. The commenter stated that EPA's approach to study quality evaluation was improved for formaldehyde, DIDP, and di-isononyl phthalate by substantially revising the number and content of the domains and metrics used to assess the quality of health effects studies, aligning the TSCA approach with the IRIS program. However, the commenter said that EPA has now reverted to using its earlier approach to study quality evaluation in the 1,1-dichloroethane draft risk evaluation and the 1,2-dichloroethane draft Hazard Assessment. For both epidemiology and toxicology studies, EPA is again using a deeply flawed study quality approach presented in its 2021 draft systematic review method that has been strongly criticized by the NASEM, the SACC, and public commenters, according to the commenter. The commenter stated that EPA's change in approach to study quality evaluation in the 1,1-dichloroethane draft risk evaluation and the 1,2-dichloroethane draft Hazard Assessment, with different methods applied in documents released only 2 months apart, is without scientific justification and is a strong indication that EPA does not have a clear understanding of what constitutes the best available science in conducting systematic review. The commenter also suggested that EPA should have used its authority under TSCA section 4 to order

manufacturers of 1,1-dichloroethane to conduct toxicity studies relevant to assessing the chemical's human health hazards to address the limitations in the scientific literature.

EPA Response: The chemical-specific protocols that accompany each risk evaluation describe all the updates and process improvement implemented into the systematic review process since the publication of the Draft Systematic Review Protocol Supporting TSCA Risk Evaluations for Chemical Substances. A lot of the updates already implemented in the systematic review process were in response to the recommendations made by NASEM and SACC. These updates are described in the chemical-specific protocols. Scientific studies were not excluded from consideration without justification. Instead, PECO screening criteria were used for all the chemicals undergoing a TSCA risk evaluation; based on the PECO statement, references either met the PECO screening criteria, did not meet the PECO screening criteria, or were considered supplemental information. All of these decisions were made publicly available in HAWC literature inventory trees. References for the chlorinated solvents project that met the PECO screening criteria were evaluated and extracted. Any updates to this process would be described in the chemical-specific protocol which was released to the public when the risk evaluation as a whole was released.

EPA has been publishing the chemical-specific protocols when the risk evaluation as a whole is publicly released. The 1,2-dichloroethane Draft Hazard Assessment was released ahead of the rest of the risk evaluation for 1,2-dichloroethane because for human health hazard 1,2-dichloroethane was used as analog for 1,1-dichloroethane; thus, 1,2-dichloroethane was released to provide transparency and clarity of the 1,2-dichloroethane studies included for systematic review. Once the entire the risk evaluation for 1,2-dichloroethane is released to the public, the chemical-specific systematic review protocol will be made available as supporting documentation.

EPA has not reverted to using the long version of the study data quality evaluation forms for the chlorinated solvents. Instead, it has to do with how chemical projects were prioritized in EPA's systematic review repository, namely DistillerSR, for the implementation of the substantially revised domains and metrics used to assess the data quality of health effects studies, which were updated to align the TSCA approach with the IRIS program. The process of implementing the new data quality evaluation forms was started after data quality evaluation and extraction for the chlorinated solvents undergoing a TSCA risk evaluation had already started; therefore, implementing the new data quality evaluation forms was not practicable. EPA has used its authority under TSCA section 4 to order manufacturers to submit data for 1,1-dichloroethane for some disciplines. Toxicity studies, particularly cancer studies, may take years to conduct and would not have met the statutorily required timeframe for completion of the 1,1-dichloroethane risk evaluation. However, EPA may issue test orders for toxicity studies in the future, if applicable.

Comment 7.2

Summary: A public commenter (0064) stated that EPA has not used its information-gathering authorities to fill identified data gaps and said EPA should use this authority before determining that a chemical does not present unreasonable risk based on lack of data.

EPA Response: EPA issued test orders for occupational air monitoring, occupational dermal absorption, and environmental acute sediment-water toxicity.

When preparing this risk evaluation, EPA obtained and considered reasonably available information, defined as 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).) EPA has

used all reasonably available information for the draft 1,1-dichloroethane risk evaluation and incorporated additional relevant information provided by the SACC and public comments on the draft 1,1-dichloroethane risk evaluation and the draft 1,2-dichloroethane human hazard assessment.

Comment 7.3

Summary: A public commenter (0066) stated that EPA issued a memorandum titled "Review of Final Study Report for 1,1,2-Trichloroethane (CASRN: 79-00-5) for evaluation of Chironomid Life-Cycle Toxicity in response to January 2021 TSCA Section 4(a) Test Order" that indicated the study received a "High" ranking during systematic review. The commenter stated that the Draft 1,1-Dichloroethane Risk Evaluation contradicted the memorandum by communicating a "medium" quality ranking without explaining why the ranking changed or detailing the quality assessment process in the main text of the draft risk evaluation. The commenter notes that specific study metrics are available in the *Draft Risk Evaluation for 1,1-Dichloroethane – Systematic Review Supplemental File: Data Quality Evaluation Information for Environmental Hazard* (U.S. EPA, 2025c) and that based on the details in this file, parts of the study are noted as consistent with the EPA-approved study protocol but received quality ratings of medium, low, or uninformative. The commenter provided examples such as experimental system/test media preparation, test substance source, number of exposure groups/spacing of exposure levels, adequacy of test conditions, and number of organisms and replicates per group.

EPA Response: The study (Smithers, 2023) received a "High" overall quality determination (OQD) during systematic review following completion of the initial evaluation and this was communicated in the memorandum as indicated by the commenter. Subsequently upon completion of the quality control (QC) evaluation, OQDs for various health outcomes were medium or uninformative. The health outcomes that received an OQD of uninformative were a result of the screening study and the preliminary exposure. Outcomes from preliminary testing are typically not used to determine a quantitative hazard threshold for use in risk assessment, as that is not their intended purpose. The purpose of the screening and preliminary testing was to determine appropriate exposure concentrations for use in the definitive study, and they served that purpose for this study. Additionally, the results of the preliminary exposure were used qualitatively in the environmental hazard assessment as discussed in Section 4.2.2 of the Risk Evaluation for 1,1-Dichloroethane.

It is correct that the complete description of the systematic review process is not included in the main text of the risk evaluation, as this is a detailed process specific to each discipline that would be cumbersome to include within the main text of the risk evaluation. The Draft Risk Evaluation for 1,1-Dichloroethane indicated that details of the evaluation metrics and rating criteria are available in the 2021 Draft Systematic Review Protocol and the systematic review protocol specific to 1,1-dichloroethane (U.S. EPA, 2025d, 2021). Additionally, the specific metric ratings for this study are available in the systematic review supplemental file indicated by the commenter.

Although the outcomes from the definitive study received OQDs of medium in the data evaluation QC instead of high, that does not impact the acceptability or useability of the study for quantitative use in the risk evaluation. However, EPA agrees that some metrics were evaluated incorrectly and has conducted a new evaluation of the study. Following completion of the new evaluation, all health outcomes from the definitive study received high OQDs, all health outcomes from the preliminary test received medium OQDs, and the immobilization outcome from the water-only screening test received an uninformative for dose response OQD.

Section 8 – Other Comments on the Draft Risk Evaluation

Comment 8.1

Summary: A public commenter (0061) stated that NEI utility members that operate commercial nuclear power reactors use 1,2-dichloroethane as part of a biocide analysis performed for their cooling ponds. The commenter requested that EPA consider including a provision in any risk management rulemaking that will allow continued use of the chemical by commercial nuclear power reactors until an alternative can be identified.

EPA Response: EPA followed up with the commenter (0061) about the use of 1,2-dichloroethane as part of a biocide analysis and confirmed this use, as a laboratory reagent for a biocide analysis, falls under the laboratory condition of use for 1,2-dichloroethane. It is not an active biocide and this use is not covered by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). TSCA section 6(b)(4)(A) and (F) requires that a Risk Evaluation not consider "costs or other nonrisk factors" such as availability of alternatives. If risk management for 1,2-dichloroethane follows the final risk evaluation for 1,2-dichlrooethanedichlrooethane, EPA may consider whether substitutes are reasonably available when deciding on regulatory actions, consistent with TSCA section 6(c).

Supporting Documents

Comment 8.2

Summary: A public commenter, in multiple submissions to the docket (0070, 0071), submitted dozens of supporting documents that were cited in their comments.

EPA Response: EPA acknowledges receipt of the documents submitted in comments EPA-HQ-OPPT-2024-0114-0070 and EPA-HQ-OPPT-2024-0114-0071. These documents were submitted in support of comment EPA-HQ-OPPT-2024-0114-0069.

Section 9 – Comments Not Related to Draft Risk Evaluation

No comments are associated with this issue.

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