Establishing Conditions of Use and Mapping to Occupational Exposure Scenarios for 1,2-Dichloroethane

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Disclaimer

- 1,2-Dichloroethane (1,2-DCA) is actively going through risk evaluation and so some of the topics discussed are still subject to change.
- Please see the following for more information:
 - 1,2-DCA Scope Document: <u>https://www.epa.gov/sites/default/files/2020-</u> <u>09/documents/casrn 107-06-2 12-dichloroethane final scope.pdf</u>
 - 1,2-DCA Public Docket: <u>https://www.regulations.gov/docket/EPA-HQ-OPPT-2018-0427</u>



Objectives

Using 1,2-DCA as an example throughout, this presentation covers the following:

- 1. Overview of 1,2-DCA and the on-going Risk Evaluation
- 2. Establishing Conditions of Use for 1,2-DCA
- 3. Mapping Conditions of Use and Occupational Exposure Scenarios



1,2-Dichloroethane Risk Evaluation Process



- April 2020: Draft scope published for 45-day public comment period
- August 2020: Final scope published after review and consideration of public comments
- Risk evaluation currently underway



Introduction to 1,2-Dichloroethane (1,2-DCA)

- aka Ethylene Dichloride (EDC)
- Colorless, oily, heavy liquid
- Slightly soluble in water
- Pleasant chloroform-like odor
- Volatile, Vapor Pressure of 79 mm Hg at 25 °C



- Used principally in synthesis of vinyl chloride monomer and other chlorinated solvents
- US Production Volume between 20 and 30 billion pounds in 2015
- Existing Exposure Limits:
 - OSHA PEL-TWA: 50 ppm
 - OSHA PEL-C: 100 ppm [5 min any 3 hrs]; 200 ppm (peak)
 - NIOSH REL-TWA: 1 ppm
 - NIOSH REL-STEL: 2 ppm



How Conditions of Use are Established

- COUs were determined for 1,2-DCA from the following
 - Chemical Data Reporting
 - Toxic Release Inventory
 - published literature
 - public comments
 - consultation with stakeholders
 - company websites
 - trade databases
 - safety data sheets
- Economists develop Use Reports using above sources to summarize known information about the chemical's uses.



Conditions of Use Table

Table 2-2. Categories and Subcategories of Conditions of Use Included in the Scope of the Risk

Evaluation

Life Cycle Stage ^a	Category ^b	Subcategory	References				
Manufacturing	Domestic	Domestic manufacture	U.S. EPA (2019a)	Life Cycle Stage ^a	Category ^b	Subcategory	References
	Import	Import	U.S. EPA (2019a)		Lubricants and Greases	Paste lubricants and greases	EPA-HQ-OPPT-2018-0427-0005
Processing	Processing as a reactant	Intermediate in: Petrochemical manufacturing; Plastic material and second	U.S. EPA (2019a); EPA-HQ-OPPT- 2018-0427-0006: EPA-HQ-OPPT- 2018-0427-0015 U.S. EPA (2019a); EPA-HQ-OPPT- 2018-0427-0006; EPA-HQ-OPPT- 2018-0427-0015 U.S. EPA (2019a)	Commercial Use	Oxidizing/ reducing agents	Oxidation inhibitor in controlled oxidative chemical reactions	EPA-HQ-OPPT-2018-0427-0006
		manufacturing; All other basic organic chemical manufacturing			Solvents (for cleaning and degreasing)	A component of degreasing and cleaning solvents	EPA-HQ-OPPT-2018-0427-0005
	Processing - Incorporated into formulation, mixture, or reaction product	Fuels and fuel additives: All other petroleum and coal products			Plastic and rubber products	Products such as: plastic and rubber products	<u>U.S. EPA (2019a)</u>
		manufacturing			Fuels and related products	Fuels and related	U.S. EPA (2019a); EPA-HQ-OPPT- 2018-0427-0006
		Processing aids: specific to petroleum production			Other use	Laboratory chemical (<i>e.g.</i> , reagent)	Thermo Fisher (2018)
	Recycling	Recycling	U.S. EPA (2019a)		DI (I I I	Embalming agent	Frigid Fluid Company (2015)
Distribution in commerce	Distribution in commerce	Distribution in commerce		Consumer Use	rubber products	products	<u>EPA-HQ-OAR-2002-0037-0203;</u> <u>EPA-HQ-OPPT-2018-0427-</u> 0040; Doucette et al. (2010)
Industrial Use	Adhesives and sealants	Adhesives and sealants	EPA-HQ-OPPT-2018-0427-0018	Disposal	Disposal	Disposal	
	Functional Fluids (closed systems)	Heat transferring agent	<u>Baldwin Filters (2015)</u>				



Life Cycle Diagram



Figure 2-11. 1,2-Dichloroethane Life Cycle Diagram



Closer Look at Some 1,2-DCA Conditions of Use

- Domestic Manufacturing
 - COU obtained from Chemical Data Reporting
- Heat Transferring Agent
 - COU obtained from Safety Data Sheets
- Adhesives and Sealants
 - COU obtained from public comments
- Intermediate In: all other basic organic chemical manufacturing
 - Intermediate in creation of UV stabilizers, a use "within" this COU.
 Informed by public comment, and discussed with the company to obtain more information.



Importance of Process Information

- Process information (diagrams, descriptions, and equipment) inform potential worker exposure activities
- Some COUs are based on few CDR entries and/or brief industry comments. From these alone it can be hard to know exactly what's happening and therefore exactly what to assess
- Examples below from Section E.1 of 1,2-DCA Scope:

E.1.3.1 Adhesives and Sealants

EPA has identified that some industrial adhesives and sealants contain 1,2-dichloroethane (EPA-HQ-OPPT-2018-0427-0018). Specific process information regarding the manner in which these products are used is unknown at this time, however, adhesives and sealants can be applied via many methods (including spray applications). EPA plans to further investigate the use of 1,2-Dichloroethane in adhesives and sealants during the risk evaluation.

E.1.3.3 Lubricants and Greases

EPA identified a safety data sheet for a low friction coating, also known as a solid film lubricant, containing 5 to 10 percent 1,2-dichloroethane (Everlube Products, 2019). According to the associated product Technical Data sheet, this product is a spray applied thermally cured lubricant used to prevent metal to metal contact when used in the presence of conventional lubricants (Everlube Products, 2003). EPA plans to further investigate the potential use of 1,2-dichloroethane in this type of process and other lubricant/grease applications during the risk evaluation.

Occupational Exposure to 1,2-DCA

- Exposure Scenarios are a combination of facts, assumptions and inferences that define a discrete situation in which potential exposures might occur. Exposure scenarios might include the source, exposed population (e.g., young children), timeframe of exposure, routes and pathways of exposure, microenvironment(s) and human activities.
- Examples of worker activities:
 - Unloading and transferring 1,2-DCA to and from storage containers and process vessels
 - Handling and disposing of waste containing 1,2-DCA
 - Cleaning and maintaining equipment
 - Sampling chemicals, formulations, or products containing 1,2-DCA for quality control
 - Repackaging chemicals, formulations, or products containing 1,2-DCA
 - Performing other work activities in or near areas where 1,2-DCA is used.



Occupational Exposure to 1,2-DCA (cont.)

- Based on 1,2-DCA's volatility, EPA plans to assess the following:
 - Worker and Occupational non-user (ONU) inhalation exposure to vapor, mists (from spray application), and dust/particles when 1,2-DCA is present as a solid product
 - Worker dermal exposure (ONUs not expected to directly handle the chemical)
 - May consider relevance of oral exposure on case-by-case basis, but not typical
- EPA will likely not make risk determinations based on assumptions about the use of personal protective equipment (PPE) or control technologies. However, EPA plans to develop exposure scenarios with and without the use of PPE and engineering controls to inform any potential risk management measures required for workers or ONUs.



Initial "Mapping"

- Once we have COUs, process information, worker activities, and we understand the possible exposure pathways and routes we can estimate the exposures
- We do this by pairing COUs with Occupational Exposure Scenarios (OESs)
- This "mapping" or "crosswalking" is done preliminarily in the scope (see Appendix F of the scope document)
- Determining OES is an iterative process, and it starts with looking at available data



Exposure Information Collection

- Reasonably Available Information: information that EPA possesses or can reasonably generate, obtain, and synthesize for use in risk evaluations, considering the deadlines specified in TSCA Section 6(b)(4)(G) for completing such evaluation
- 1. Exposure data collected by OSHA, NIOSH
- 2. Databases containing publicly available, peer-reviewed literature
- 3. Gray literature, which is defined as the broad category of data/information sources not found in standard, peer-reviewed literature databases
- 4. Data and information submitted under:
 - TSCA Section 4 (Test Orders)
 - TSCA Section 5 (SNURS)
 - TSCA Section 8(e) (substantial risk reporting)
 - TSCA Section 8(d) (unpublished health and safety studies)
 - "For your information" (FYI) submissions



Analysis Plan

- 1. Review reasonably available exposure monitoring data
- 2. Review exposure data for surrogate chemicals that have uses, volatility and physical and chemical properties similar to 1,2-DCA
- 3. For COUs with limited/no data, review existing exposure models that may be applicable in estimating exposure levels
 - Emission scenario documents and generic scenarios
- 4. Review reasonably available data that may be used in developing, adapting or applying exposure models to a particular risk evaluation scenario.
- 5. Consider and incorporate applicable Engineering Controls and/or Personal Protective Equipment into exposure scenarios (**most likely not for consideration in risk determination)
- 6. Map or group each condition of use to occupational exposure scenario(s). More details about this in next slide.
- 7. Evaluate the weight of the scientific evidence of occupational exposure data, which may include qualitative and quantitative sources of information.



Example OES Mapping

- OES determination is largely driven by similarities and differences in release and exposure ulletpotential between COUs and the availability of data and modeling approaches to assess occupational exposures.
- The below examples are from an ongoing risk evaluation and are subject to change ullet



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Thank you!

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