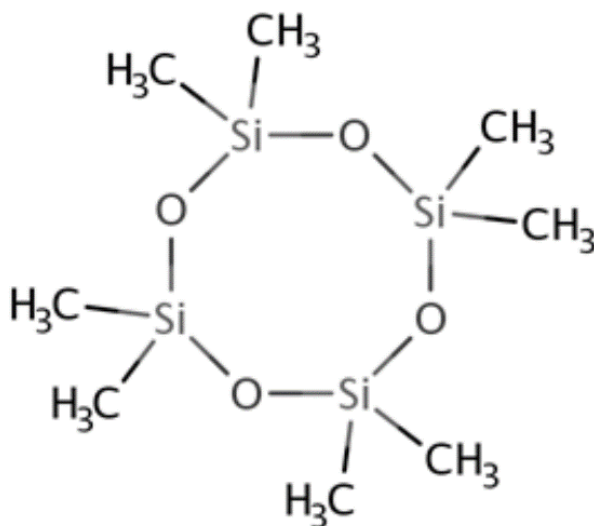

**Data Quality Evaluation and Data Extraction Information for
Environmental Release and Occupational Exposure for
Octamethylcyclotetrasiloxane (D4)**

Systematic Review Support Document for the Draft Risk Evaluation

CASRN: 556-67-2



September 2025

This supplemental file contains information regarding the data extraction and quality evaluation results for data sources that were considered for the *Draft Risk Evaluation for Octamethylcyclotetrasiloxane (D4)* and that underwent systematic review. EPA conducted data extraction, and quality evaluation based on author-reported descriptions and results; additional analyses (e.g., statistical analyses) potentially conducted by EPA are not contained in this supplemental file. EPA used the TSCA systematic review process described in the *Draft Systematic Review Protocol Supporting TSCA Risk Evaluations for Chemical Substances* (also referred to as the '2021 Draft Systematic Review Protocol').

Data that met the RESO screening criteria during the full-text screening was extracted by three data types, general facility, occupational exposure, and environmental release, as explained in Section 6.2 of the 2021 Draft Systematic Review Protocol. Five different data quality evaluation forms were used depending on the data type and condition of use (COU), as explained in Appendix M of the 2021 Draft Systematic Review Protocol. All references with data points containing monitoring data (e.g., measured occupational exposures) underwent data quality evaluation as described in Section M.6.1, using the monitoring data quality metrics. All references with data points containing environmental release data (e.g., measured or calculated quantities of chemical release across facility fence line) underwent data quality evaluation as described in Section M.6.2, using the environmental release data quality metrics. All references with data points containing published models for environmental release or occupational exposure (e.g., published models used to calculate occupational exposure or environmental releases) underwent data quality evaluation as described in Section M.6.3, using the published models for environmental release or occupational exposure quality metrics. All references with data points containing completed exposure or risk assessments (e.g., completed exposure or risk assessments containing a broad range of data types) underwent data quality evaluation as described in Section M.6.4, using the completed exposure or risk assessments quality metrics. All references with data points containing reports for data or information other than exposure or release data (e.g., process description) underwent data quality evaluation as described in Section M.6.5, using the reports for data or information other than exposure or release data quality metrics. The extracted data and their data quality evaluation are available in the tables below.

Additionally, each data type and condition of use is evaluated independently within a given study; therefore, each reference may have more than one overall quality determination (OQD) to reflect the quality of each outcome and the exposures and releases more appropriately as described by the study authors. No OQD is determined for each reference, as a whole, if it contains data from more than one evidence stream.

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Occupational Exposure		
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5885380	Corning., Dow (1977). Case history study on the operators in 602 building, Midland plant for exposure to octamethylcyclotetrasiloxane.	15
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Completed Exposure or Risk Assessments

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Study Citation:	AS., COWI (2018). Screening programme 2017: Suspected PBT compounds.			
HERO ID:	7303021			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Physical form:	dust, air			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method. (EPA method)
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Norway, an OECD country.
	Metric 3:	Applicability	Uninformative	Data are for ambient air and air in consumer households
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing exposure duration, frequency, PPE, engineering controls, worker activities, and number of workers.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The monitoring study does not address variability or uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	Corning,, Dow (1977). Case history study on the operators in 602 building, Midland plant for exposure to octamethylcyclotetrasiloxane.			
HERO ID:	5885380			
Conditions of Use:	Silicone processors (intermediate) / plastics material and resin manufacturing			
EXTRACTION				
Parameter	Data			
Worker activity description:	polymerization operators; the polymerizers are continuous units where D4 is fed on 2nd level and gum is automatically filled into fiber packs on 1st level (page 5 of 15)			
Exposure route:	inhalation			
Physical form:	vapor/particulate			
Personal sampling data:	0.17 - 2.2 ppm, average of 0.75 ppm for personal samples; full results in Tables II (pg 12)			
Area sampling data:	0.28 - 2.2 ppm with an average of 0.68 ppm in area TWA samples (Table III on page 13). 0.29-4.4 ppm, average of 1.6 ppm in grab area samples (pg 3,6 and Table IV on page 14);			
Exposure duration:	Doesn't include shift lengths, but provides employment history in Table I (pg 11)			
Comments:	8-hr TWA; analytic method: Grab air samples + IR (area); Charcoal tubes + GC (personal) (pg 5)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for PROC, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Monitoring data are greater than 20 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing metadata such as exposure frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by conducting both area and personal sampling, but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	Corning,, Dow (1998). Absorption of 14C-octamethylcyclotetrasiloxane using the flow-through diffusion cell system for in vitro dermal absorption in human skin, with cover letter dated 6/29/1998.			
HERO ID:	5887449			
Conditions of Use:	Miscellaneous			
EXTRACTION				
Parameter	Data			
Exposure route:	Dermal			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for absorption rates of D4 in humans, which can be applied to many in-scope occupational scenarios
	Metric 4:	Temporal Representativeness	Low	Monitoring data are greater than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed in sampling/analytical methodology but variability is not addressed.
Overall Quality Determination			Medium	

Study Citation:	Corning,, Dow (1989). Industrial hygiene survey for octamethylcyclotetrasiloxane (D4) at Midland plant.			
HERO ID:	7310564			
Conditions of Use:	Processing as a reactant (Polymers)			
EXTRACTION				
Parameter	Data			
Worker activity description:	polymer operators during operation and shutdown.			
Exposure route:	inhalation			
Physical form:	vapor or particulate (not specified)			
Personal sampling data:	”Operation: 0.15-0.31 ppm, average of 0.24 ppm Shutdown: 0.13-0.59 ppm, average of 0.35 ppm (pg 4); Full sampling results in Table 1 (pg 5)”			
Exposure duration:	Sampling durations in Table 1 (pg 5)			
Comments:	8-hr TWA; Analytic method: sampling on charcoal tubes, analyzed according to ”procedures detailed in IH Report No. H-0-0000-16” (pg 4)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Sampling/analytical methodology is not specified (references an earlier report).
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for PROC, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Monitoring data are greater than 20 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing metadata such as exposure frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by conducting both area and personal sampling, but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	EC/HC, (2008). Screening assessment for the challenge: Octamethylcyclotetrasiloxane (D4): CASRN 556-67-2.			
HERO ID:	6993847			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, dermal, oral			
Area sampling data:	The mean concentration of D4 in indoor air measured in homes in a study in New York was 32.5 µg/m3 and the maximum concentration was 249 µg/m3. In another study, for women, the estimated maximum plausible daily absorbed dose of D4 from the modelled personal care products, aggregated over inhalation, dermal and oral exposure, is 0.243 mg/kg-bw/day. For men, the estimated maximum plausible daily absorbed dose, aggregated over inhalation, dermal and oral exposure, is 0.041 mg/kg-bw/day.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method. (EPA method)	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from Canada, an OECD country.	
	Metric 3: Applicability	High	Data are for personal care products, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	Medium	Monitoring data are greater than 10 years old but no more than 20 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (means, ranges) but discrete samples not provided and distribution not fully characterized.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sample type and exposure type provided but missing exposure duration, frequency, PPE, physical form, engineering controls, worker activities, and number of workers.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by running Crystal Ball simulations for the exposure data.	
Overall Quality Determination		High		

Study Citation:	Harley, K. G., Calderon, L., Nolan, S., J.E., Maddalena, R., Russell, M., Roman, K., Mayo-Burgos, S., Cabrera, J., Morga, N., Bradman, A. (2021). Changes in Latina women's exposure to cleaning chemicals associated with switching from conventional to "green" household cleaning products: The LUCIR intervention study. Environmental Health Perspectives 129(9):97001.
HERO ID:	9551210
Conditions of Use:	Commercial use in furnishing, cleaning, treatment/care products

EXTRACTION

Parameter	Data
Worker activity description:	The worker activity in general terms is cleaning the kitchen and bathroom in a house. The cleaning activities lasted 30 min. by design. The products used were household cleaning products possessed by the monitored women and green replacement products. The green replacement products were as follows: two all-purpose cleaners (one in a spray bottle, one in a pour bottle), toilet bowl cleaner, powder cleanser, disposable wipes, and dish soap. In specific terms, the activities are as follow (Pg. 4/9): The most common activities were cleaning toilets and wiping surfaces such as counters, cabinets, and appliances, which were performed by more than 90% of women at each visit. Seventy percent of women mopped their floors at both visits, and more than half hand washed their dishes, cleaned their bathtubs or showers, and cleaned glass.
Exposure route:	inhalation
Physical form:	vapor
Personal sampling data:	Household cleaners in possession of monitored women: Geometric mean: 1.50 micrograms per cubic meter; geometric standard deviation: 6.18; detection frequency: 100%. 74% of women used ventilation while cleaning. Green household cleaners: Geometric mean: 1.67 micrograms per cubic meter; geometric standard deviation: 9.83; detection frequency: 100%. The number of monitored women in both cases is 49. 80% of women used ventilation while cleaning. In the case of both type of cleaners, ventilation includes open windows/doors or use of fans/air conditioning/exhaust hood.
Comments:	The data source contains D4 PBZ inhalation exposure data pertaining to Latina women living in Salinas, California, who cleaned their homes with household cleaning products (i.e., consumer exposure.) The duration of cleaning was 30 min. but this is not the exposure duration because people may be exposed to D4 even after use of the household cleaner. Frequency of cleaning by the monitored women is reported but this is not the frequency of cleaning by workers.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	Medium	The sampling and analytical methods are not indicated to be NIOSH or OSHA methods.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data pertains to exposure in the U.S.
	Metric 3: Applicability	Medium	The data pertain to consumer exposure but the scenario is similar to the worker scenario that is associated with commercial use in cleaning products which is a COU
	Metric 4: Temporal Representativeness	High	The data are no more than 10 years old.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All meta data reported.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability in determinants of exposure is discussed. Uncertainty in results not discussed.

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Study Citation:	Harley, K. G., Calderon, L., Nolan, S., J.E., Maddalena, R., Russell, M., Roman, K., Mayo-Burgos, S., Cabrera, J., Morga, N., Bradman, A. (2021). Changes in Latina women’s exposure to cleaning chemicals associated with switching from conventional to ”green” household cleaning products: The LUCIR intervention study. Environmental Health Perspectives 129(9):97001.		
HERO ID:	9551210		
Conditions of Use:	Commercial use in furnishing, cleaning, treatment/care products		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Liu, N., Xu, L., Cai, Y. (2017). Methyl siloxanes in barbershops and residence indoor dust and the implication for human exposures. Science of the Total Environment 618:1324-1330.			
HERO ID:	4168341			
Conditions of Use:	Use in personal care products			
EXTRACTION				
Parameter	Data			
Exposure route:	dust ingestion in barber shop			
Physical form:	adsorbed to particles and dust; high binding affinities			
Area sampling data:	Area samples: mean, min, and max levels of D4 found in indoor dust from barbershops; mean: 3644 ng/g with D4 detected in all 36 samples.... Estimated exposure provided in ng/kg-bw/day based on estimated ingestion of dust particles in barbershop.... Area samples from houses, dormitories, and bath houses are provided but not occupational exposures			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	Uninformative	Potential sources as specified from the report could be due to ' normal shampoo and hair conditioner, a considerable amount of hair dyes, softeners, perm products, and even makeup products', which fall under FDA. Therefore the data is for an occupational scenario outside of the scope.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old (2018).
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean, max, min, % of detects) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All metadata provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by measuring at 36 different barbershops and limited discussion of uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	Ministers,, N.C. (2006). Siloxanes in the Nordic Environment.			
HERO ID:	7002238			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Physical form:	vapor and particles			
Area sampling data:	Ambient air in the Nordic countries contains concentrations of D4 between 0.08-4.0 ug/m3. Indoor air in Swedish homes had a mean of 9.0 ug/m3 (range 0.6-51.2 ug/m3) of D4. (P. 10/93)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method. (Norway National Air Laboratory)
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the Nordic countries, all of which are OECD countries.
	Metric 3:	Applicability	Low	Data are for ambient air and air in consumer households, which is similar to the in-scope occupational scenarios of personal care products, automotive care products, and adhesives and sealants.
	Metric 4:	Temporal Representativeness	Medium	Monitoring data are greater than 10 years old but no more than 20 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing exposure duration, frequency, PPE, engineering controls, dermal data, worker activities, and number of workers.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by sampling the air of 6 different countries.
Overall Quality Determination			Medium	

Study Citation:	NICNAS, (2020). Cyclic volatile methyl siloxanes: Environment tier II assessment.			
HERO ID:	6996262			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Physical form:	vapor			
Area sampling data:	The air concentrations of these chemicals near waste treatment and disposal facilities such as STPs and landfills can be significantly higher than background levels. For example, a study of air emissions at waste water treatment plants and landfills in determined the cumulative concentration of cyclic volatile methyl siloxanes (D3 to D6) to be more than 8000 ng/m above the aeration tank of a waste water treatment plant, and up to 7000 ng/m in air sampled onsite at a landfill. The measured onsite air concentrations were on average more than an order of magnitude greater than background concentrations. The cumulative emissions to air of cyclic volatile methyl siloxanes from both waste water treatment plants and landfills in this study were dominated by D5 (Cheng, et al., 2011). Very high concentrations of volatile methyl siloxanes (> 1 milligram per cubic metre (or > 10 ng/m)) have been measured in landfill and waste water treatment plant biogases at multiple sites around the world (Rücker and Kümmerer, 2015). (pg. 15/26)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Report does not specify the methods used.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Australia, an OECD country.
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing exposure duration, frequency, PPE, dermal data, engineering controls, worker activities, and number of workers.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by compiling results from different studies. Uncertainty isn't addressed.
Overall Quality Determination		Medium		

Study Citation:	SEHSC, (2019). Results of personal manufacture and processor worker exposure monitoring.			
HERO ID:	7002870			
Conditions of Use:	Manufacturing, processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	D4 loading to vessel, process sample collection, process filter change (full air purifying respirator).			
Personal sampling data:	1.2 - 12 (ppm)			
Exposure duration:	≤15 mins - ≤ 480 min			
Personal protective equipment:	Nitrile gloves, uniform, safety glasses, boots, hard hat, air purifying respirator			
Engineering control:	Local exhaust ventilation, closed connection/vapor return lines on bulk containers, hood over mixer			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	Low	Sampling/analytical methodology is not specified.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for manufacturing/processing, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Monitoring data are no more than 10 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sample type and exposure type provided but missing physical form and exposure frequency.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by comparing multiple worker activities but uncertainty is not addressed.	
Overall Quality Determination		Medium		

Study Citation:	SEHSC, (2019). Results of personal manufacture and processor worker exposure monitoring.			
HERO ID:	7002870			
Conditions of Use:	Manufacturing, processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Process line connection/disconnection, Unloading, VesselCleaning, Process Line Breaking, VesselConfined Space Entry, Equipment Cleaning, Extruding Process-ing, Material adding, Repackaging, Misc (boil out dough mixer), transfer tovessel via hard pipe.			
Personal sampling data:	<1 (ppm)			
Exposure duration:	≤10 mins - ≤ 600 mins			
Personal protective equipment:	Air purifying respirator, nitrile gloves, gloves, uniform, safety glasses, face shield, boots, hard hat			
Engineering control:	Air ventilation			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Sampling/analytical methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for manufacturing/processing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing physical form, number or workers, exposure frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by comparing multiple worker activities but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	SEHSC, (2019). Results of personal manufacture and processor worker exposure monitoring.			
HERO ID:	7002870			
Conditions of Use:	Manufacturing, processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Lab technician: D4 sample analysis			
Personal sampling data:	ND (0.04 ppm)			
Exposure duration:	≤ 360			
Personal protective equipment:	Nitrile gloves, gloves, safety glasses			
Engineering control:	Laboratory fume hoods			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Sampling/analytical methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for manufacturing/processing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing physical form and exposure frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by comparing multiple worker activities but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	Sha, B., Dahlberg, A. K., Wiberg, K., Ahrens, L. (2018). Fluorotelomer alcohols (FTOHs), brominated flame retardants (BFRs), organophosphorus flame retardants (OPFRs) and cyclic volatile methylsiloxanes (cVMSs) in indoor air from occupational and home environments. Environmental Pollution 241:319-330.
HERO ID:	5083520
Conditions of Use:	Consumer Exposures

EXTRACTION	
Parameter	Data
Exposure route:	Inhalation
Physical form:	Gas
Area sampling data:	See various Tables in supplemental file
Comments:	Briefly describes that cyclic volatile methyl siloxanes (cVMSs) are commonly used in the production of silicone polymers, in coatings (e.g. paints, varnishes, lacquers and furniture polishes) and in personal care products (e.g. cosmetics and shampoo) (Lu et al., 2010; Wang et al., 2013). Because of volatility, these groups of compounds have the potential to be gradually released from the treated products into the air (Capela et al., 2016; Horii and Kannan, 2008; Huber et al., 2011; Liu et al., 2015; Saito et al., 2007). Provides useful information regarding building age and compounds emitted.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling or analytical methodology is an approved OSHA or NIOSH method or is well described and found to be equivalent to approved OSHA or NIOSH methods.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Sweden
	Metric 3:	Applicability	Low	The data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a worker scenario
	Metric 4:	Temporal Representativeness	High	Data is less than 10 years old
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Monitoring data include all associated metadata, including sample types, exposure types, sample durations, exposure durations worker activities, and exposure frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The monitoring study addresses variability in the determinants of exposure for the sampled site or sector. The monitoring study addresses uncertainty in the exposure estimates or uncertainty can be determined from the sampling and analytical method.

Overall Quality Determination

High

Study Citation:	Shields, H. C., Fleischer, D. M., Weschler, C. J. (1996). Comparisons among VOCs measured in three types of US commercial buildings with different occupant densities. Indoor Air 6(1):2-17.			
HERO ID:	3449521			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation			
Physical form:	Gas			
Area sampling data:	0.1-10.2 (µg / m3)			
Engineering control:	Low to moderate ventilation systems			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Low	Data are for airborne concentrations in buildings. Applicable for exposure to office workers but not directly an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Monitoring data are greater than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by sampling at multiple locations, but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	Tang, X., Misztal, P. K., Nazaroff, W. W., Goldstein, A. H. (2015). Siloxanes are the most abundant volatile organic compound emitted from engineering students in a classroom. Environmental Science & Technology Letters 2(11):303-307.			
HERO ID:	3449377			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation			
Area sampling data:	0-2.4 (ppb)			
Number of workers:	17-69			
Engineering control:	Single-pass mechanical ventilation system operates from 8:00 to 20:45. The mechanical ventilation system provides an air-exchange rate of 5 ± 0.5 h–1 during operation.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Uninformative	Data are for consumer (engineering students in classrooms) use of personal care products, which is not in scope
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing physical form, exposure duration, exposure frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Uninformative		

Study Citation:	Tran, T. M., Abualnaja, K. O., Asimakopoulos, A. G., Covaci, A., Gevao, B., Johnson-Restrepo, B., Kumosani, T. A., Malarvannan, G., Minh, T. B., Moon, H. B., Nakata, H., Sinha, R. K., Kannan, K. (2015). A survey of cyclic and linear siloxanes in indoor dust and their implications for human exposures in twelve countries. Environment International 78:39-44.
HERO ID:	3013038
Conditions of Use:	Laboratory use of products

EXTRACTION	
Parameter	Data
Exposure route:	estimate that dust ingestion is more prominent exposure route than dermal absorption
Physical form:	dust; component in personal care and household products
Area sampling data:	total siloxane concentration of 1050 ng/g found in laboratory dusts

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S. among other countries
	Metric 3: Applicability	High	Data are for laboratory use, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (median) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sample type and exposure type provided but missing location of lab samples/type of lab where samples were observed.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by samples collected at multiple sites, but uncertainty is not addressed.

Overall Quality Determination	High
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Study Citation:	Tran, T. M., Hoang, A. Q., Le, S. T., Minh, T. B., Kannan, K. (2019). A review of contamination status, emission sources, and human exposure to volatile methyl siloxanes (VMSs) in indoor environments. Science of the Total Environment 691:584-594.
HERO ID:	6836071
Conditions of Use:	Various

EXTRACTION	
Parameter	Data
Exposure route:	inhalation
Physical form:	vapor/particulate
Area sampling data:	Table 2 (pg 5) contains mean and range concentrations for a variety of VMSs (mostly different totals, i.e., D4-D6 consolidated) as well as for multiple industries. Similar data (means and ranges for a variety of VMSs) presented in Table 3 (pg 8) for concentrations in indoor dust
Dermal exposure data:	nan

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Sampling/analytical methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data/authors are from various countries, including the U.S., OECD countries such as Japan, and non-OECD countries such as China
	Metric 3:	Applicability	High	Data are for multiple in-scope occupation scenarios.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (means, ranges) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Sample type provided but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by consolidating sampling data from multiple literature sources/industries, but uncertainty is not addressed.

Overall Quality Determination	Medium
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Study Citation:	Tran, T. M., Kannan, K. (2015). Occurrence of cyclic and linear siloxanes in indoor air from Albany, New York, USA, and its implications for inhalation exposure. Science of the Total Environment 511:138-144.		
HERO ID:	3014985		
Conditions of Use:	Commercial use of products		
EXTRACTION			
Parameter	Data		
Exposure route:	vapor inhalation and dust ingestion; dermal possible through application of personal care products to skin		
Physical form:	particulate matter and vapors; personal care products		
Area sampling data:	range, mean, and detection frequency for siloxane samples in particulate and vapor phases, including salons and laboratories; lab D4 dust ranged 13.9-108 ug/g and vapor ranged 5.27-87.5 ng/m3; salon D4 dust ranged 145-1680 ug/g and vapor ranged 193-722 ng/m3.... also provided total concentrtaion in indoor air based on cumulative vapor and particulate samples		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for laboratory and salon use of products, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mena, range, and detection frequency) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sample type and exposure type provided but missing location of lab samples/type of lab where samples were observed.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by multiple samples taken for two different phases (particulate and vapor), but uncertainty is not addressed.
Overall Quality Determination		High	

Study Citation:	Tran, T. M., Le, H. T., Vu, N. D., Dang, Minh, G. H., Minh, T. B., Kannan, K. (2017). Cyclic and linear siloxanes in indoor air from several northern cities in Vietnam: Levels, spatial distribution and human exposure. Chemosphere 184:1117-1124.			
HERO ID:	3861464			
Conditions of Use:	Use of Personal Care Products (Barbers and Beauticians)			
EXTRACTION				
Parameter	Data			
Exposure route:	vapor inhalation and dust ingestion			
Physical form:	particulate matter and vapors from lab and salon products			
Area sampling data:	range, mean, median, and detection frequency for siloxane samples in particulate and vapor phases, including salons; salon D4 dust ranged ND-200 ug/g and vapor ranged 20.1-662 ng/m3.... also provided total estimated exposure to cyclic siloxanes in each setting based on cumulative vapor and particulate samples			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from Vietnam, a non-OECD country.
	Metric 3:	Applicability	Uninformative	Data are for commercial use of hair care products, which is outside the scope (non-TSCA).
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean, median, range, and detection frequency) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing location of lab samples/type of lab where samples were observed as well as salon activities.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by multiple samples taken for two different phases (particulate and vapor), but uncertainty is not addressed.
Overall Quality Determination		Uninformative		

Study Citation:	Tran, T. M., Le, H. T., Vu, N. D., Dang, Minh, G. H., Minh, T. B., Kannan, K. (2017). Cyclic and linear siloxanes in indoor air from several northern cities in Vietnam: Levels, spatial distribution and human exposure. Chemosphere 184:1117-1124.			
HERO ID:	3861464			
Conditions of Use:	Lab Use			
EXTRACTION				
Parameter	Data			
Exposure route:	vapor inhalation and dust ingestion			
Physical form:	particulate matter and vapors from lab and salon products			
Area sampling data:	range, mean, median, and detection frequency for siloxane samples in particulate and vapor phases, including laboratories; lab D4 dust ranged ND-77.7 ug/g and vapor ranged ND-62.3 ng/m3;..... also provided total estimated exposure to cyclic siloxanes in each setting based on cumulative vapor and particulate samples			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from Vietnam, a non-OECD country.
	Metric 3:	Applicability	High	Data are for commercial use of various products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean, median, range, and detection frequency) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing location of lab samples/type of lab where samples were observed as well as salon activities.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by multiple samples taken for two different phases (particulate and vapor), but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	Wang, G., Zhang, Z., Hao, Z. (2019). Recent advances in technologies for the removal of volatile methylsiloxanes: A case in biogas purification process. Critical Reviews in Environmental Science and Technology 49(24):2257-2313.			
HERO ID:	6836163			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Area sampling data:	Sewage Treatment Plants (STP): 230-6980 (ug/m^3); Landfills: 841-15,000 (ug/m^3) (see Table 2, note they are literature values with sources provided)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling or analytical methodology is an approved OSHA or NIOSH method or is well described and found to be equivalent to approved OSHA or NIOSH methods.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Article is from a non-OECD country, however, the data is cited from European countries
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	Sources cited for data range from 1999 - 2019
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Monitoring data include sample type (e.g., area) but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability and uncertainty by providing data from several studies that uses several different analytical methods
Overall Quality Determination		Medium		

Study Citation:	Xu, L., Huang, Z., Zhang, Q., Xiang, X., Zhang, S., Cai, Y. (2020). Methylsiloxanes and their brominated products in one e-waste recycling area in china: emission, environmental distribution, and elimination. Environmental Science & Technology 54(7):4267-4274.			
HERO ID:	6836349			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Physical form:	dust; generated from burning or pyrolysis of printed wiring boards			
Area sampling data:	mean dust concentration of D4 in e-waste recycling areas: 22.8 microgram/gram; also provided range of values from samples.... Concentration in dusts were higher for workshops with higher temperature thermal processes; D4 found in soils surrounding e-waste recycling workshops			
Comments:	There appears to be a supplemental file associated with this article			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	High	Data are for disposal of D4-containing products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean, range) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All metadata provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium		

Study Citation:	Xu, L., Shi, Y., Liu, N., Cai, Y. (2014). Methyl siloxanes in environmental matrices and human plasma/fat from both general industries and residential areas in China. Science of the Total Environment 505C:454-463.
HERO ID:	2533248
Conditions of Use:	Commercial use of products

EXTRACTION	
Parameter	Data
Exposure route:	vapor inhalation and dust ingestion; vapor inhalation suggested as the primary exposure pathway for cyclic siloxanes; dermal exposure not assessed and considered negligible
Physical form:	component in paints, lubricants, polish, fabric softener, and spot remover products
Area sampling data:	Total concentration of cyclic methyl siloxanes (CMS) ranged from 58.6 to 572 microgram/m3 for industrial facilities (included D4-D6); Range of CMS for indoor dust samples in industrial facilities was 2.74 to 50.4 microgram/gram... Concentrations found in samples for each type of industrial site are shown graphically
Personal protective equipment:	anti-dust masks were used in some of the industrial sites sampled; only prevents dust ingestion

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	High	Data are for commercial use of various products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution for chemical concentrations characterized by limited statistics (range, detection frequency, and graphical distribution of data) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All metadata provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by samples collected at multiple sites, but uncertainty is not addressed.

Overall Quality Determination	Medium
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Study Citation:	Xu, L., Shi, Y., Wang, T., Dong, Z., Su, W., Cai, Y. (2012). Methyl siloxanes in environmental matrices around a siloxane production facility, and their distribution and elimination in plasma of exposed population. Environmental Science & Technology 46(21):11718-11726.			
HERO ID:	2558926			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Exposure route:	vapor inhalation and dust ingestion			
Area sampling data:	Air samples of D4 in production facility showed average of 2.7 mg/m3; Dust samples for D4 showed average somewhere between 32 and 82.2 microgram/gram; actual amounts from samples shown graphically; samples taken in methyl siloxanes production facility: raw material storage workshop, cracking and rectification workshops, and product storage workshop			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	High	Data are for manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All metadata provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Reddy, M. B., Looney, R. J., Utell, M. J., Plotzke, K. P., Andersen, M. E. (2007). Modeling of human dermal absorption of octamethylcyclotetrasiloxane (D-4) and decamethylcyclopentasiloxane (D-5). Toxicological Sciences 99(2):422-431.			
HERO ID:	818319			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation and dermal			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Model is peer-reviewed and free of mathematical errors, based on sound approaches/methods, and uses appropriate equations and parameters
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Model can be applied to manufacture, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Model is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	Model approach, equations, and choice of parameter values are transparent. Rationales for choice of approach, equations, and parameter values provided.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Low	Variability and uncertainty are not addressed
Overall Quality Determination			High	

Study Citation:	Biesterbos, J. W., Beckmann, G., Wel, van, L., Anzion, R. B., Goetz, von, N., Dudzina, T., Roeleveld, N., Ragas, A. M., Russel, F. G., Scheepers, P. T. (2015). Aggregate dermal exposure to cyclic siloxanes in personal care products: Implications for risk assessment. Environment International 74:231-239.			
HERO ID:	5426551			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the Netherlands, an OECD country.
	Metric 3:	Applicability	Medium	Data are for application of personal care products. Although not an OES in scope, there is useful dermal exposure data that could inform occupational dermal assessment.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.		
HERO ID:	1267867		
Conditions of Use:	Use		
EXTRACTION			
Parameter	Data		
Worker activity description:	Paint applications by spray painting, brush, roller, dip, flow, curtain, tumbling, spray, and powder coating.		
Exposure route:	inhalation, ingestion, dermal		
Physical form:	mists, gases, vapors, dust, fumes		
Number of workers:	Over half a million workers are involved in paint and coating application in the United States. Of this, 200,000 workers are employed in automobile body repair shops.		
Personal protective equipment:	Protective clothing, respirators.		
Engineering control:	Local exhaust ventilation, mist reduction (reduce surface tension, coat surfact, tank covers), isolation of stored chemicals.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	Medium	Data are for the use of paints and coatings, but D4 isn’t explicitly mentioned,
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed by compiling results from different studies. Uncertainty isn’t addressed.
Overall Quality Determination		High	

Study Citation:	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.			
HERO ID:	1267867			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Operators of process machienry, loading of ingredients, solution preparation.			
Exposure route:	inhalation			
Physical form:	Dust, solvent vapors, fumes			
Number of workers:	Approximately 200,000 rubber workers in the U.S.			
Engineering control:	Use of water to suppress dust, using coarse chemicals forms, local exhaust hoods, and dilution ventilation.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	Medium	Data are for rubber product manufacturing, but D4 isn't explicitly mentioned.	
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed by compiling results from different studies. Uncertainty isn't addressed.	
Overall Quality Determination		High		

Study Citation:	Capela, D., Alves, A., Homem, V., Santos, L. (2016). From the shop to the drain - Volatile methylsiloxanes in cosmetics and personal care products. Environment International 92-93(Elsevier):50-62.			
HERO ID:	5427151			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation, dermal			
Physical form:	solid/liquid			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Portugal, an OECD country.
	Metric 3:	Applicability	Uninformative	Data are for consumer use of personal care products regulated by FDA.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by sampling multiple product exposures but uncertainty is not addressed.
Overall Quality Determination		Uninformative		

Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.		
HERO ID:	5884316		
Conditions of Use:	Manufacturing		
EXTRACTION			
Parameter	Data		
Worker activity description:	”operators involved in hydrolysis and polymerization and gum production processes (PP); hydrolysis operators and polymerization operators not elsewhere classified (SP) loading (described pg 352-53, 356)”		
Exposure route:	Dermal/inhalation		
Personal sampling data:	”Geometric means (TWA): PP: 0.24 ppm; SP: 0.02 ppm (pg 326); data summarized with arithmetic means included on pg 364”		
Dermal exposure data:	Dermal exposure data		
Exposure duration:	For ADD estimates: assumed 8hr exposure duration (pg 54)		
Exposure frequency:	For ADD estimates: assumed 5 days/wk, 50 wk/yr (pg 54)		
Personal protective equipment:	gloves (pg 356)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for MFG, an in-scope occupational scenarios.
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided in attachments, not extracted).
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed by considering different distributions for/transformations of the sampling data. Variability addressed by evaluating sampling data for multiple sites and industries.
Overall Quality Determination		High	

Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.
HERO ID:	5884316
Conditions of Use:	Silicone processors (intermediate) / plastics material and resin manufacturing

EXTRACTION

Parameter	Data
Worker activity description:	"operators involved in hydrolysis and polymerization and gum production processes (PP); compounding and packaging process operators (CP); packaging, shipping, loading, and warehousing (PSLW); auxiliary personnel, such as maintenance, supervisors, quality control, R&D (AUX); hydrolysis operators and polymerization operators not elsewhere classified (SP) Polymerization operators are required to perform manual packaging tasks. However, these tasks only require the operators to place lids on the tops of cardboard drums (actually referred to as ""fiber-pacs"""); but do not require that the operators touch the gum material. This makes their opportunity for dermal exposure small. (pg 353) Compounding: [High temp (HTC)]: at the end of each batch, the mixing apparatus must be opened, dumped, and scraped clean. Because of these high temperatures, mixing operators must wear gloves during cleaning. This reduces the potential for dermal absorption exposure. As stated, the gum that is used as a compounding feedstock is known to contain residual levels of unreacted cyclics (including D4, D5, and D6) so the act of opening the vessel at this high temperature may lead to inhalation exposures. [Low temp (LTC)]: Because sanitation issues are of high concern in some products (particularly those products which have a medical end-use), operators sometimes wear gloves (as well as other body protection such as hair nets, body suits, etc.) This reduces the likelihood that dermal absorption will be a significant exposure pathway in these cases. The process is conducted at room temperature but it is not enclosed, so that it is conceivable that inhalation exposure levels of volatilized residual cyclics would be comparable to those in high-temperature compounding operations.(pg 354) Packaging described pg 354"
Exposure route:	Dermal/inhalation
Physical form:	low-viscosity fluids to solid rubbers (pg 327)
Personal sampling data:	"Geometric means (567 TWA samples): PP: 0.24 ppm; CP: 0.23 ppm; PSLW: 0.05 ppm; AUX: 0.02 ppm; SP: 0.02 ppm (pg 326); data summarized with arithmetic means included on pg 364 Figure on pg 360"
Dermal exposure data:	Dermal exposure data
Exposure duration:	"For ADD estimates: assumed 8hr exposure duration (pg 54) ""Several shift arrangements are used by silicone manufacturers, but most work out to a 42-hour work week. It is assumed in this analysis that workers in silicone manufacturing plants are exposed to cyclomethicones-at levels corresponding to those presented earlier in this appendix-throughout an 8.74-hour day, 5-day week, 50-week year-and consequently a 2,184-hour working year."" (pg 369)"
Exposure frequency:	For ADD estimates: assumed 5 days/wk, 50 wk/yr (pg 54)
Number of workers:	4500 (pg 44)
Personal protective equipment:	gloves, "dermal and respiratory protection" for HTC, no respiratory protection for LTC (pg 354)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for PROC, an in-scope occupational scenarios.
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided in attachments, not extracted).
Domain 3: Accessibility/ Clarity			

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Study Citation:		Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.		
HERO ID:		5884316		
Conditions of Use:		Silicone processors (intermediate) / plastics material and resin manufacturing		
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty				
	Metric 7:	Metadata Completeness	High	Uncertainty is addressed by considering different distributions for/transformations of the sampling data. Variability addressed by evaluating sampling data for multiple sites and industries.
Overall Quality Determination			High	

Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.			
HERO ID:	5884316			
Conditions of Use:	Personal care product manufacturing (formulation)			
EXTRACTION				
Parameter	Data			
Worker activity description:	"for antiperspirant: shipping and receiving (6%); compounding (13%); filling and packing (58%); maintenance (9%); quality control and laboratory (11%); and production supervision (3%) (pg 217) miscellaneous finishing (MF)"			
Exposure route:	"Inhalation is the principal exposure pathway for occupational exposure in the manufacture of AP/Ds. There is the possibility of incidental dermal contact resulting from spills, etc. Cyclomethicone is a relatively expensive ingredient, so there is a commercial incentive to minimize process emissions and losses." (pg 181-82)			
Physical form:	"antiperspirant/deodorants: solid (stick), liquid (roll-on); aerosol. Smaller percentages as liquid (pumped), gels, creams/powders (pg 185) hair/skin care: creams, gels, liquids, lotions, waxes (pg 252)"			
Personal sampling data:	(TWA sampling) AP/Ds : Peronal sampling arithmetic/geometric mean: 0.33/0.15 ppm (pg 218) HC/SCs: Personal sampling arithmetic/geometric mean: 2.44/1.76 ppm for plant 1 (principally SC), 0.012/0.007 ppm for plant 2 (HC) MF: 0.05 ppm (pg 326); data summarized with arithmetic means included on pg 364 Figure on pg 360			
Area sampling data:	(TWA sampling) AP/Ds: Area sampling arithmetic means: 2.69 ppm (compounding); 0.71 ppm (filling/packing); 0.07 ppm (shipping/receiving); 0.06 ppm (laboratory) (pg 220)			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	For ADD estimates: assumed 8hr exposure duration (pg 54)			
Exposure frequency:	"For ADD estimates: assumed 5 days/wk, 50 wk/yr (pg 54) AP/D plants have varying operating schedules, ranging from a one-shift per day/5-day perweek schedule to a three-shift per day/7-day per week schedule. (pg 211)"			
Number of workers:	"1900 for antiperspirant formulators, 22800 for hair/skin care product formulators (pg 44); 10 plants employed 862 full-time employees and produced 62.5 MM lbs of antiperspirant; 72,352 lbs/worker. A total of 93.75 MM lbs of AP/Ds produced in 1995, which results in 1,293 full-time employees assuming same ratio. Per census data, 2,380 workers in AP/D production (pg 215-16) "			
Personal protective equipment:	"AP/Ds: safety glasses, hair covering, work coats/clothes, gloves. Respirators not typically worn (pg 182)"			
Engineering control:	General exhaust ventilation and LEV (pg 182)			
Comments:	Number of samples:"48 for antiperspirant workers (pg 57)32 samples from 2 sites (16 each) for HC/SC product formulators (pg 318)"			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Low	Data are for formulation of personal care products, an FDA use, which is similar to the the in-scope occupational scenarios relating to processing into formulation.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided in attachments, not extracted).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.

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Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.		
HERO ID:	5884316		
Conditions of Use:	Personal care product manufacturing (formulation)		
Domain	Metric	EVALUATION Rating	Comments
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed by considering different distributions for/transformations of the sampling data. Variability addressed by evaluating sampling data for multiple sites and industries.
Overall Quality Determination		Medium	

Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.		
HERO ID:	5884316		
Conditions of Use:	Personal care products (barbers and beauticians)		
EXTRACTION			
Parameter	Data		
Worker activity description:	Workers shampooing client’s hair, for example, may inhale cyclomethicone vapors when shampoos, rinses, conditioners, and related products are opened and applied (pg 320)		
Exposure route:	Dermal/inhalation		
Physical form:	”hair/skin care: creams, gels, liquids, lotions, waxes (pg 252), spray (aerosol and non-aerosol) (pg 254) Cyclomethicone possesses multifunctional utility and can perform as conditioning agents/emollients, spread agents, carriers/solvents, and shine boosters, plasticizers, antiwhitening agents, agents to reduce valve clogging, and agents to mitigate the ””billowing”” effect of airborne particles from an aerosol spray (pg 301)”		
Personal sampling data:	(TWA) arithmetic/geometric mean: 0.085/0.083 ppm (pg 322)		
Dermal exposure data:	Dermal exposure data		
Exposure duration:	For ADD estimates: assumed 8hr exposure duration (pg 54)		
Exposure frequency:	”For ADD estimates: assumed 5 days/wk, 50 wk/yr (pg 54); ””The average work weeks for beauticians and barbers are 28.0 hours and 31.6 hours, respectively”” (pg 252)”		
Number of workers:	401,750 (15,500 barbers and 387,500 beauticians) (pg 44)		
Personal protective equipment:	Some workers in this occupational group use gloves as a routine measure, which minimizes the likelihood ofdermal exposure to hands and arms, but most use gloves only for certain tasks-such as when applying hair coloring-and not for others, such as washing the customer’s hair. (pg 320)		
Comments:	6 samples (pg 322)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	Uninformative	Data are for use of personal care products, which is not in-scope (FDA use)
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided in attachments, not extracted).
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed by considering different distributions for/transformations of the sampling data. Variability addressed by evaluating sampling data for multiple sites and industries.
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Octamethylcyclotetrasiloxane (D4)

Occupational Exposure

HERO ID: 5884316 Table: 4 of 4

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Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.
HERO ID:	5884316
Conditions of Use:	Personal care products (barbers and beauticians)

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Uninformative	

Study Citation:	Dudzina, T., Goetz, von, N., Bogdal, C., Biesterbos, H., J.W., Hungerbühler, K. (2014). Concentrations of cyclic volatile methylsiloxanes in European cosmetics and personal care products: Prerequisite for human and environmental exposure assessment. Environment International 62:86-94.			
HERO ID:	6833831			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Exposure route:	Dermal			
Physical form:	liquid, gas			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Switzerland, an OECD country.
	Metric 3:	Applicability	Medium	Data are for personal care products. Although not an in-scope occupational scenario, the dermal data may inform occupational dermal assessment.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (median) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by sampling multiple product types and building types but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	Franzen, A., Landingham, Van, C., Greene, T., Plotzke, K., Gentry, R. (2016). A global human health risk assessment for Decamethylcyclopentasiloxane (D5). Regulatory Toxicology and Pharmacology 74:S25-S43.
HERO ID:	3223678
Conditions of Use:	Manufacturing, Incorporation into formulation, Commercial use

EXTRACTION	
Parameter	Data
Exposure route:	Dermal and inhalation; dermal only for barbers and beauticians expected due to contact with D5-containing products
Area sampling data:	Arithmetic mean (geometric mean) of D5 air concentrations for various worker groups: 2.23ppm (1.07ppm) for antiperspirant workers, 1.06ppm (0.83ppm) for skin care workers, 0.002ppm (0.001ppm) for hair care workers, 0.143ppm(0.103ppm) for dry cleaner workers, 0.0587ppm (0.0286ppm) for silicone manufacturers, 0.008ppm for barbers/beauticians... (Inhalation exposures for workers involved in formulation of antiperspirants/deodorants, workers involved in manufacture of hair-care/skin-care products, dry cleaning workers using GreenEarth solvent, workers in D5 production, and barbers/beauticians)
Dermal exposure data:	Dermal exposure data
Exposure duration:	28 hours per week or 5.6 hours per day for 50 weeks a year used for analysis of barbers/beauticians; 8.75hr/day and 5day/wk for silicone manufacturers; 8hr/day and 5day/wk for other product formulation workers; cumulative number of years a person works in his or her occupation, weighted average of median tenure in years of full-time workers between 16-59 was 10.2yrs for men and 6.4yrs for women
Exposure frequency:	hair product application assumed to occur once every 30 minutes for 5-day work week (12 to 15 applications of hair-care product per day)

		EVALUATION	
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	Medium	Data are for occupational exposure scenarios for D5, which is similar to the in-scope occupational scenarios for D4.
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (range and single central tendency values) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.

Overall Quality Determination

High

Study Citation:	Gentry, R., Franzen, A., Landingham, Van, C., Greene, T., Plotzke, K. (2017). A global human health risk assessment for octamethylcyclotetrasiloxane (D4). Toxicology Letters 279(Suppl 1):23-41.
HERO ID:	4167493
Conditions of Use:	Incorporation into products, use of products

EXTRACTION	
Parameter	Data
Exposure route:	only inhalation exposure considered for manufacturing; both inhalation and dermal for barbers/beauticians, and dermal is major exposure route (page 3)
Area sampling data:	D4 concentrations in workplace air for one source showed 2310 ug/m3 for production of D4, 4000 ug/m3 for antiperspirant/deodorant formulation, 29600 ug/m3 for skin care workers, and 150 ug/m3 for hair care workers (page 7)
Exposure duration:	5.6 hours per day working for barbers/beauticians, with 12 to 15 hair care product applications per day estimated (see table 3 on page 8 and discussion on page for more)
Exposure frequency:	5 days/week for most employees (page 8)

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for commercial production and use of personal care products, in-scope occupational scenarios.
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (single central tendency values) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.

Overall Quality Determination	High
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Study Citation:	Group., K.C. (1999). Estimation of margins of exposure: a preliminary risk assessment of octamethylcyclotetrasiloxane (D4) based on reproductive toxicity studies in rats, w/cover letter dated 07/23/199.
HERO ID:	5884333
Conditions of Use:	Silicone processors (intermediate) / plastics material and resin manufacturing

EXTRACTION	
Parameter	Data
Worker activity description:	For silicone workers, based on the basic types of operations performed in the manufacture and processing of D4, ECA (1997) identified six basic job categories. These categories were primary polymer operators, secondary polymer operators, compounding and packaging operators, miscellaneous finishing operators, packaging, shipping, loading and warehouse personnel and auxiliary personnel (pg 86).
Exposure route:	dermal/inhalation
Physical form:	liquid/vapor
Personal sampling data:	(Same data as 5884316) Arithmetic mean time-weighted average D4 air concentrations ranged from 0.0375 ppm in the auxiliary work areas to 0.3977 ppm in the primary polymer operations areas. ECA (1997) calculated the mean D4 air concentration for all silicone workers to estimate ADIs from inhalation. (pg 86) Arithmetic mean (geometric mean): pg 87 0.1908 (0.0950) ppm
Dermal exposure data:	Dermal exposure data
Exposure duration:	8.75 (pg 87)
Exposure frequency:	assumed 250 days/yr (pg 87); assumed 12 dermal contact events per year (due to spills)
Comments:	567 samples (pg 86)

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	The methodology for personal sampling is not specified, but there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for PROC, an in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (means) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by evaluating sampling data for multiple sites and industries, but uncertainty is not addressed.

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Octamethylcyclotetrasiloxane (D4)

Occupational Exposure

HERO ID: 5884333 Table: 1 of 1

...continued from previous page

Study Citation:	Group., K.C. (1999). Estimation of margins of exposure: a preliminary risk assessment of octamethylcyclotetrasiloxane (D4) based on reproductive toxicity studies in rats, w/cover letter dated 07/23/199.		
HERO ID:	5884333		
Conditions of Use:	Silicone processors (intermediate) / plastics material and resin manufacturing		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	Guo, J., Zhou, Y., Cui, J., Zhang, B., Zhang, J. (2019). Assessment of volatile methylsiloxanes in environmental matrices and human plasma. Science of the Total Environment 668:1175-1182.			
HERO ID:	6836347			
Conditions of Use:	Asphalt paving, roofing, and coating materials			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation			
Area sampling data:	Results shown graphically[assume ~25 - 100 ug/m^3]			
Personal protective equipment:	Gloves, anti-dust mask			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data are from China, a non-OECD country.	
	Metric 3: Applicability	High	Data are for asphalt paving, roofing, and coating materials, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	Low	Sample distribution is characterized by total cVMS and graphs that show the contribution of D4. Deciphering values from the graphs could lead to uncertainty.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Results not fully transparent but methods, assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by sampling at multiple sites but uncertainty is not addressed.	
Overall Quality Determination		Medium		

Study Citation:	Lee, M., Kim, J. H., Lee, D., Kim, J., Lim, H., Seo, J., Park, Y. K. (2018). Health risk assessment on hazardous ingredients in household deodorizing products. International Journal of Environmental Research and Public Health 15(4):744.
HERO ID:	4730751
Conditions of Use:	Deodorizing agents

EXTRACTION	
Parameter	Data
Area sampling data:	0.0101 (mg/m ³)
Dermal exposure data:	Dermal exposure data

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method. Air concentration not measured but calculated from amount of product used and volume of the room, which is acceptable for an estimate.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Korea, an OECD country.
	Metric 3:	Applicability	Low	Data are for consumer use of deodorizing agents, which is similar to commercial use of cleaning and furnishing care products
	Metric 4:	Temporal Representativeness	High	Model is based on data less than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination	Medium
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Study Citation:	OECD, (2021). Emission scenario document on the use of vapour degreasers.
HERO ID:	12392017
Conditions of Use:	Use of Solvents

EXTRACTION	
Parameter	Data
Worker activity description:	Section 2 provides descriptions of various types of degreasing operations, Section 2.4 identifies common activities that releases and exposures are expected to occur
Exposure route:	Dermal, Inhalation
Physical form:	Liquid and/or vapor
Personal sampling data:	Inhalation: Provides methods for modeling exposures to non-volatile and volatile liquids and solids.
Dermal exposure data:	Dermal exposure data
Exposure duration:	Up to 8-hrs a day
Exposure frequency:	up to 250 days a year
Number of workers:	9 workers and 4 ONUs per facility
Personal protective equipment:	A recent monitoring study of worker exposure at five vapour degreasing facilities across several industries indicated that respiratory protection was used at only one of five facilities studied. At this facility, one worker (out of 31) effectively used the respirator for less than 15 to 20 minutes for the entire work shift. Two other workers at the facility briefly wore air-purifying respirator but did not wear it properly and failed quantitative fit testing. Respirator was not used by other employees or in other facilities. The study also reported that only few workers occasionally wore gloves, and those who wore gloves did not choose the proper glove material for the vapour degreasing chemical (Hanley et al., 2010[34])

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS/ESD is based on U.S. data.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.

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Study Citation:		OECD, (2021). Emission scenario document on the use of vapour degreasers.		
HERO ID:		12392017		
Conditions of Use:		Use of Solvents		
Domain		Metric	EVALUATION Rating	Comments
Overall Quality Determination			High	

Study Citation:	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.			
HERO ID:	3808976			
Conditions of Use:	Automotive Coating Application			
EXTRACTION				
Parameter	Data			
Worker activity description:	transferring and mixing liquid products, container cleaning, transferring mixed coating to application equipment, overspray			
Exposure route:	dermal and inhalation			
Dermal exposure data:	nan			
Exposure frequency:	250 days/yr			
Number of workers:	8 workers/site			
Personal protective equipment:	air-purifying respirators or air-supplied respirators, Gloves (typically latex or nitrile), paint suits, and face masks/eye protection			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data	
	Metric 3: Applicability	Medium	Data is for multiple in-scope occupational scenarios; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	2011 ESD which utilizes information collected prior to that time period	
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (min, max, mean) but discrete samples not provided and distribution not fully characterized.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple coating types.	
Overall Quality Determination		High		

Study Citation:	OECD, (2009). Emission scenario document on adhesive formulation.			
HERO ID:	3827299			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading, container cleaning, mixing operations, sampling, equipment cleaning, packaging			
Exposure route:	dermal and inhalation			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	days/yr equal to number of bt/yr			
Number of workers:	22 workers/site			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Low	Model results characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions and types of adhesives.
Overall Quality Determination		Medium		

Study Citation:	OECD, (2011). Emission scenario document on the use of metalworking fluids.			
HERO ID:	3827418			
Conditions of Use:	Use of Degreasing Solvents			
EXTRACTION				
Parameter	Data			
Worker activity description:	Describes activities that may result in inhalations and/or dermal exposures			
Exposure route:	Inhalation and dermal			
Physical form:	Liquid			
Personal sampling data:	Provides methods for modeling exposures to non-volatile and volatile liquids			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	Default of 247 days/year			
Number of workers:	2 workers (typical) to 46 (high end)			
Personal protective equipment:	safety glasses, hearing protection, boots, gloves.			
Engineering control:	Ventilation, mist collectors, machine enclosures (full or partial, automated processes)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.
Overall Quality Determination			High	

Study Citation:	OECD, (2015). Emission scenario document on use of adhesives.		
HERO ID:	3833136		
Conditions of Use:	Adhesive Application		
EXTRACTION			
Parameter	Data		
Worker activity description:	unloading, container cleaning, adhesive application, equipment cleaning, curing/drying		
Exposure route:	dermal and inhalation		
Personal sampling data:	”dermal: Provides methods for modeling exposures to solids and non-volatile liquids Inhalation: Provides methods for modeling exposures to mists and volatile liquids”		
Dermal exposure data:	nan		
Exposure frequency:	50-250 days/yr		
Number of workers:	26-106 workers/site		
Personal protective equipment:	chemical-resistant gloves and safety glasses. Heat-resistant gloves are used when applying hot-melt adhesives		
Engineering control:	Spray booths		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions, types of adhesives, and end use markets.
Overall Quality Determination		High	

Study Citation:	OECD, (2011). Emission scenario document on radiation curable coating, inks and adhesives.			
HERO ID:	3840008			
Conditions of Use:	Paint and coating manufacture			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading, container cleaning, sampling, equipment cleaning, filter media changeout, packaging			
Exposure route:	dermal and inhalation			
Personal sampling data:	dermal: Provides methods for modeling exposures to both solids and non-volatile liquids Inhalation: Provides methods for modeling exposures to both solids and volatile liquids			
Exposure frequency:	250 days/yr			
Number of workers:	18-39 workers/site			
Personal protective equipment:	Fabric or non-woven long sleeved shirts and pants, coveralls, and neoprene or rubber gloves. Barrier creams may be used to facilitate hand washing when materials or products penetrate gloves or other PPE. A rubber apron or rubber suit and rubber boots may also be worn in cases where there is potential for splashing on or penetration through clothing			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	2011 scenario document with data greater than 20 years old.
	Metric 5:	Sample Size	Low	Model results characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions and types of UV curable products.
Overall Quality Determination		Medium		

Study Citation:	OECD, (2011). Emission scenario document on the chemicals used in water-based washing operations at industrial and institutional laundries.
HERO ID:	6387321
Conditions of Use:	Use of laundry products (industrial and institutional)

EXTRACTION	
Parameter	Data
Worker activity description:	Figure 0-1 provides a process flow diagram with the following exposure points: - Dermal and inhalation exposure from connecting transfer lines or from scooping and pouring.- Dermal and inhalation exposure during container cleaning (if containers cleaned on-site).- Dermal exposure from handling damp laundry and inhalation exposure to vaporized chemicals during operations.
Exposure route:	Inhalation and dermal exposures
Exposure duration:	Can be 8 or 12 hours
Exposure frequency:	up to 250 days a year
Number of workers:	default of 9 workers per site
Personal protective equipment:	Pg 60/133 - EPA visited an industrial laundry on February 14, 2006 for the development of this scenario. At the site, workers wore gloves and a faceshield while moving drums and connecting chemical transfer lines. PPE was not worn during other operations at the facility (CEB, 2006b). A guide for occupational safety at industrial laundries recommends the following PPE:- Skin and eye protection when handling corrosive substances;- Respirator protection when handling substances which produce dusts or vapors that can be inhaled- Skin protection if worker's hands are constantly immersed in water or wash solutions containing detergents and other chemicals. (DIR, 1994)
Engineering control:	No engineering controls mentioned

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS/ESD is based on U.S. data.
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The ESD is more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.

Overall Quality Determination

High

Study Citation:	SEHSC, (2020). Request for risk evaluation under the Toxic Substances Control Act; Octamethylcyclotetrasiloxane (D4; CASRN: 556-67-2).			
HERO ID:	7296376			
Conditions of Use:	Manufacture, processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Chemical operator: D4 loading to vessel, process sample collection, process filter change.			
Exposure route:	Dermal, inhalation			
Personal sampling data:	Chemical operators: 1.2-12 (ppm); Lab technicians: 0.04 (ppm); Logistics operator: <1 (ppm) (122/640)			
Area sampling data:	Manufacture of D4: 0.1908 (ppm) (123/640)			
Dermal exposure data:	nan			
Exposure duration:	Process sample collection: 30min/day; loading a vessel: 480 min/day; filter changes: 15-30 mins/day			
Exposure frequency:	Filter changes occur a maximum of 1/week for 50 weeks/year			
Personal protective equipment:	Impervious gloves, uniforms, safety glasses			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for manufacturing/processing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by comparing multiple worker activities but uncertainty is not addressed.
Overall Quality Determination			High	

Octamethylcyclotetrasiloxane (D4)

Occupational Exposure

HERO ID: 7296376 Table: 2 of 2

Study Citation:	SEHSC, (2020). Request for risk evaluation under the Toxic Substances Control Act; Octamethylcyclotetrasiloxane (D4; CASRN: 556-67-2).			
HERO ID:	7296376			
Conditions of Use:	Personal Care Products			
EXTRACTION				
Parameter	Data			
Personal sampling data:	2.44 (ppm)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for personal care products, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		High		

Study Citation:	Sha, B., Dahlberg, A. K., Wiberg, K., Ahrens, L. (2018). Fluorotelomer alcohols (FTOHs), brominated flame retardants (BFRs), organophosphorus flame retardants (OPFRs) and cyclic volatile methylsiloxanes (cVMSs) in indoor air from occupational and home environments. Environmental Pollution 241:319-330.
HERO ID:	5083520
Conditions of Use:	Consumer Exposures

EXTRACTION	
Parameter	Data
Exposure route:	Inhalation
Physical form:	Gas
Area sampling data:	See various Tables in supplemental file
Comments:	Briefly describes that cyclic volatile methyl siloxanes (cVMSs) are commonly used in the production of silicone polymers, in coatings (e.g. paints, varnishes, lacquers and furniture polishes) and in personal care products (e.g. cosmetics and shampoo) (Lu et al., 2010; Wang et al., 2013). Because of volatility, these groups of compounds have the potential to be gradually released from the treated products into the air (Capela et al., 2016; Horii and Kannan, 2008; Huber et al., 2011; Liu et al., 2015; Saito et al., 2007). Provides useful information regarding building age and compounds emitted.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Sweden, an OECD country.
	Metric 3:	Applicability	High	Data are for cleaning and furniture care products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by sampling at multiple buildings and building types but uncertainty is not addressed.

Overall Quality Determination	High
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Study Citation:	Tran, T. M., Tu, M. B., Vu, N. D. (2018). Cyclic siloxanes in indoor environments from hair salons in Hanoi, Vietnam: Emission sources, spatial distribution, and implications for human exposure. Chemosphere 212:330-336.			
HERO ID:	6833839			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation			
Physical form:	Solid (dust)			
Area sampling data:	Women: 24.2 (ng/kg-bw) day; Men: 18.8 (ng/kg-bw day). (P. 5/7)			
Exposure duration:	8 hr per day			
Comments:	Table 2-Estimated exposure doses to cyclic siloxanes through dust ingestion and inhalationof indoor air (ng kg-bw-1 day-1).			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data are from Vietnam, a non-OECD country.	
	Metric 3: Applicability	High	Data are for personal care products, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by comparing men and women but uncertainty is not addressed.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).
HERO ID:	10368811
Conditions of Use:	Use of Cleaning Products

EXTRACTION	
Parameter	Data
Worker activity description:	Exposure points from process description:A. Inhalation (if volatile) and dermal exposure during transfer operations of liquid furnishing cleaning products.B. Inhalation and dermal exposure during transfer operations and use of solid furnishing cleaning products.C. Inhalation exposure to mists/aerosols (non-volatile chemicals, spray application), inhalation exposure to vapors (volatile chemicals), and dermal exposure to liquids (all application types)from application and use of liquid furnishing cleaning products.
Exposure route:	Inhalation and dermal
Physical form:	liquid and solid
Personal sampling data:	Provides methodology to calculate potential inhalation exposures
Dermal exposure data:	Dermal exposure data
Exposure duration:	up to 8-hrs a day
Exposure frequency:	up to 250 days a year
Number of workers:	9 workers and 1 ONU per site
Personal protective equipment:	In general, appropriate PPE includes safety glasses, safety goggles or face shield during prolonged handling or when splashing is possible; respiratory protection is not normally required (Zep Inc., 2017; Namco Mfg., Inc., 2014; Arm & Hammer, 2013).

		EVALUATION	
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.

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Study Citation:	U.S. EPA, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).		
HERO ID:	10368811		
Conditions of Use:	Use of Cleaning Products		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	U.S. EPA, (2022). Commercial use of automotive detailing products - Generic scenario for estimating occupational exposures and environmental releases (Methodology review draft).
HERO ID:	10480464
Conditions of Use:	Commercial Use - Automotive detailing products

EXTRACTION	
Parameter	Data
Worker activity description:	container unloading (liquids and solids), application and use of automotive detailing products.
Exposure route:	Dermal, Inhalation
Physical form:	liquids, pastes, or clays/waxes
Personal sampling data:	dermal: Provides methods for modeling exposures to non-volatile and volatile liquids and solidsInhalation: Provides methods for modeling exposures to non-volatile and volatile liquids and solids
Exposure duration:	8 hr/day
Exposure frequency:	260 days/yr
Number of workers:	3-4 workers/detailing facility
Personal protective equipment:	particle respirators, ear plugs, safety glasses, aprons, knee pads, nitrile gloves, cooling towels, and face masks (page 37)
Engineering control:	miscellaneous control technologies include performing vehicle detailing in areas where there are no floor drains, keeping container lids closed, avoiding the use of detergents, using sloping pavement around drains, using high-pressure and low-volume sprays, and labeling all containers. Industrial and commercial facilities often collect dust emissions in ventilation filters

		EVALUATION	
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS is based on U.S. data
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results

Overall Quality Determination	High
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Study Citation:	U.S. EPA, (2023). Use of laboratory chemicals - Generic scenario for estimating occupational exposures and environmental releases (Revised draft generic scenario).			
HERO ID:	10480466			
Conditions of Use:	Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Worker activity description:	Container unloading (liquids and solids), container cleaning, equipment cleaning, laboratory analyses, disposal of laboratory chemicals.			
Exposure route:	Dermal, Inhalation.			
Physical form:	Liquid or solid.			
Personal sampling data:	Inhalation: Provides methods for modeling exposures to non-volatile and volatile liquids and solids.			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	8-12 hr/day.			
Exposure frequency:	250 days/yr.			
Number of workers:	3 workers/facility and 3 ONUs/facility.			
Personal protective equipment:	Basic PPE includes wearing long sleeves (lab coats), long pants, closed-toe shoes, safety glasses or goggles, and gloves during the use of laboratory chemicals. Additional PPE may be worn depending on the level of hazard or specifics of the process.			
Engineering control:	Fume hood.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).		
HERO ID:	11182966		
Conditions of Use:	Repackaging		
EXTRACTION			
Parameter	Data		
Worker activity description:	Unloading transport containers, container cleaning, equipment cleaning, loading of transport containers.		
Exposure route:	Dermal, Inhalation		
Physical form:	Liquid or solid		
Personal sampling data:	Inhalation: Provides methods for modeling exposures to non-volatile and volatile liquids and solids.		
Dermal exposure data:	Dermal exposure data		
Exposure duration:	8-12 hr/day		
Exposure frequency:	The number of operating days is given in a range of 174-260 days/yr with an EPA default of 260 days/yr.		
Number of workers:	3 workers/facility and 1 ONUs/facility (total number of employees and facilities given in Table 5-3).		
Personal protective equipment:	Commonly used PPE includes safety glasses, face shields, aprons, and gloves.		
Engineering control:	Local exhaust ventilation.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS is based on U.S. data.
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Assessment is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple worker activities.
Overall Quality Determination		High	

Study Citation:	U.S. EPA, (2014). Formulation of waterborne coatings - Generic scenario for estimating occupational exposures and environmental releases -Draft.			
HERO ID:	3827197			
Conditions of Use:	Formulation of Paints and Coatings			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading transport containers, container cleaning, equipment cleaning, loading of transport containers, filtration.			
Exposure route:	Dermal, Inhalation			
Physical form:	Liquid			
Personal sampling data:	Inhalation: Provides methods for modeling exposures to non-volatile and volatile liquids			
Dermal exposure data:	nan			
Number of workers:	Section 5.2 provides number of workers estimates for various industry sectors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.			
HERO ID:	6549571			
Conditions of Use:	Rubber Converting			
EXTRACTION				
Parameter	Data			
Worker activity description:	Provides descriptions of worker activities and exposure points for major process steps			
Exposure route:	Inhalation and dermal			
Physical form:	Liquid or solid			
Personal sampling data:	provides methodology to calculate inhalation exposures (dust and/or vapor)			
Exposure duration:	provides default exposure duration of 8 hours			
Exposure frequency:	default of 253 exposure days/year			
Number of workers:	24 total employees (19 workers and 5 ONUs) per site			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Low	The completed exposure or risk assessment is more than 20 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.
Overall Quality Determination			High	

Study Citation:	Brooke, D. N., Crookes, M. J., Gray, D., Robertson, S. (2009). Environmental risk assessment report: Decamethylcyclopentasiloxane.			
HERO ID:	7330442			
Conditions of Use:	All- generic			
EXTRACTION				
Parameter	Data			
Exposure route:	Oral, dermal			
Physical form:	oily liquid at room temperature and atmospheric pressure			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S
	Metric 3:	Applicability	Medium	The report is for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, in terms of the type of industry, operations, and work activities.
	Metric 4:	Temporal Representativeness	Medium	more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Johnson, W., Bergfeld, W. F., Belsito, D. V., Hill, R. A., Klaassen, C. D., Liebler, D. C., Marks, J. G., Shank, R. C., Slaga, T. J., Snyder, P. W., Andersen, F. A. (2011). Safety assessment of cyclomethicone, cyclotetrasiloxane, cyclopentasiloxane, cyclohexasiloxane, and cycloheptasiloxane. International Journal of Toxicology 30(Suppl. 3):149S-227S.			
HERO ID:	6835206			
Conditions of Use:	Use of personal care products			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Dermal exposure data:	Dermal exposure data			
Comments:	Table 6. Blood, Plasma, and Expired Air Levels of D4 AppliedDermally to HumansSamples of blood and expiredair were collected prior to exposure and at 1, 2, 4, 6, and 24hours postexposure.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for use of personal care products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		High		

Study Citation:	NCBI, (2021). PubChem database: compound summary: Octamethylcyclotetrasiloxane.		
HERO ID:	6982832		
Conditions of Use:	Various		
EXTRACTION			
Parameter	Data		
Exposure route:	dermal/inhalation (pg. 19)		
Physical form:	dry powder, liquid (pg. 5) vapor(pg. 19)		
Number of workers:	number of persons reasonably likely to be exposed during the manufacturing, processing, or use of octamethylcyclotetrasiloxane may be as low as 10-24 workers up to the range of 100-499 workers per plant. NIOSH (NOES Survey 1981-1983) has statistically estimated that 3,383 workers (1,689 of these are female) are potentially exposed to octamethylcyclotetrasiloxane in the US (pg 36)		
Personal protective equipment:	face shield and safety glasses, protective gloves, impervious clothing, flame retardant antistatic protective clothing. Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). (pg 26-7)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are for various OECD countries (PubChem citing U.S. and EU countries).
	Metric 3: Applicability	High	Data are for various in-scope occupational scenarios.
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	N/A	PPE and number of workers info
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent (PubChem).
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Variability is not applicable (PPE and number of workers info) but uncertainty is briefly discussed.
Overall Quality Determination		High	

Study Citation:	Nelson, G. O., Priante, S. J., Strong, M., Anderson, D., Fallon-Carine, J. (2000). Permeation of substituted silanes and siloxanes through selected gloves and protective clothing. AIHAJ 61(5):709-714.			
HERO ID:	1171884			
Conditions of Use:	Various			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal exposures			
Personal protective equipment:	permeation rates and breakthrough times tested for various glove and suit materials; D4 did not have a permeation rate observed and breakthrough time over 480 minutes for all materials			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for dermal exposure scenarios, which includes in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (breakthrough time and overall steady state permeation rate) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed by ASTM test methods. Variability addressed by different materials.
Overall Quality Determination		High		

Study Citation:	Ng, M. G., Tongeren, van, M., Semple, S. (2014). Simulated transfer of liquids and powders from hands and clothing to the mouth. Journal of Occupational and Environmental Hygiene 11(10):633-644.
HERO ID:	3222353
Conditions of Use:	COU involving dermal exposure

EXTRACTION	
Parameter	Data
Exposure route:	hand/object to mouth (inadvertent ingestion)
Physical form:	Liquid and powder
Dermal exposure data:	Dermal exposure data
Exposure frequency:	pg. 2/13: Observational studies of adults have shown average hand-to-mouth contact frequencies of 2–5 contacts per hour
Number of workers:	Pg. 2/13: Cherrie et al. have estimated that inadvertent ingestion could be a significant route of occupational exposure for 16% of the U.K. working population.
Comments:	This data source contains laboratory measurements of the transfer efficiency associated with inadvertent ingestion resulting from hand/object -to-mouth transfer. The transfer efficiency is equal to the ingested fraction of the material located on the hand or object. The transfer efficiencies reported in the data source pertain to surrogate chemicals. An equation is given for calculating exposure, or the amount of material inadvertently ingested, from these transfer efficiencies. pg. 12/13: "This study has provided evidence that transfer of chemicals from the hands or objects to the mouth is influenced by parameters including physical state, chemical/physical properties, and use of protective clothing. These findings may have implications for exposure modeling and exposure control. This work was preliminary in nature and additional study is required to obtain a greater understanding of the parameters that can affect transfer and the possible interactions between them."

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The equation for amount inadvertently ingested is reasonable. The method of measuring transfer efficiency is sound.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The report is for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation. Not specific to D4.
	Metric 4:	Temporal Representativeness	High	The data were generated less than 10 years ago.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.

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Study Citation:	Ng, M. G., Tongeren, van, M., Semple, S. (2014). Simulated transfer of liquids and powders from hands and clothing to the mouth. Journal of Occupational and Environmental Hygiene 11(10):633-644.		
HERO ID:	3222353		
Conditions of Use:	COU involving dermal exposure		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	SCCP, (2005). Opinion on Octamethylcyclotetrasiloxane (D4) cyclomethicone (INCI name).			
HERO ID:	6989916			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Exposure route:	Dermal			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	Medium	Dermal data is for the neat chemical which is similar to the concentration of the chemical during manufacture.
	Metric 4:	Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

Octamethylcyclotetrasiloxane (D4)

Occupational Exposure

HERO ID: 6989916 Table: 2 of 2

Study Citation:		SCCP, (2005). Opinion on Octamethylcyclotetrasiloxane (D4) cyclomethicone (INCI name).		
HERO ID:		6989916		
Conditions of Use:		Personal Care Products		
EXTRACTION				
Parameter		Data		
Exposure route:		Dermal		
Dermal exposure data:		Dermal exposure data		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness		Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
		Metric 3: Applicability	Uninformative	Personal Care Products are not in scope for the risk evaluation.
		Metric 4: Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.
		Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity		Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty		Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Uninformative	

Study Citation:	SCCS, (2010). Opinion on cyclomethicone Octamethylcyclotetrasiloxane (Cyclotetrasiloxane, D4) and Decamethylcyclopentasiloxane (Cyclopentasilox-ane, D5).			
HERO ID:	6989663			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Exposure route:	Dermal			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.	
	Metric 3: Applicability	Uninformative	Personal care products are not in scope for the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.	
Overall Quality Determination		Uninformative		

Study Citation:	SCCS, (2010). Opinion on cyclomethicone Octamethylcyclotetrasiloxane (Cyclotetrasiloxane, D4) and Decamethylcyclopentasiloxane (Cyclopentasiloxane, D5).		
HERO ID:	6989663		
Conditions of Use:	Manufacture		
EXTRACTION			
Parameter	Data		
Exposure route:	dermal		
Dermal exposure data:	Dermal exposure data		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3: Applicability	Medium	Results are from tests conducted on the neat chemical which is similar to manufacturing the pure chemical.
	Metric 4: Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium	

Study Citation:	SEHSC, (2008). Comments on Health and Environment Canada's draft screening assessments for octamethylcyclotetrasiloxane (D4; CAS No. 556-67-2), Canada Gazette, part I, volume 142 no. 20 (May 17, 2008).
HERO ID:	7346551
Conditions of Use:	Generic - all COUs

EXTRACTION	
Parameter	Data
Exposure route:	Dermal, inhalation
Physical form:	volatile cyclic siloxane
Area sampling data:	Air (inhalation) (P. 4/118)maximum worst case exposure values (EEV)- 4.20 mg/m3estimated toxicity values (ENEV)- 0.004 mg/m3
Comments:	SEHSC believes that the screening assessment for D4 does not consider all of the available scientific data for D4, and inappropriately concluded that D4 is persistent (P) in water, bioaccumulative (B), inherently toxic (iT) and a POP-like material. We respectfully recommend that EC reassess the P, B, and iT assessment on D4 once the robust, on-going field monitoring program is complete. Even without waiting for the additional monitoring studies, the recommendation by EC to include D4 on the List of Toxic Substances and for virtual elimination is not supported by the weight of the evidence available at this time. SEHSC strongly recommends the text in the Characterization of Ecological Risk be modified to read, "This information suggests that D4 does not have the potential to cause ecologicalharm in Canada."

		EVALUATION	
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	more than 10 yearsbut no more than 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination	Medium
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Study Citation:	Sigma-Aldrich, (2018). Safety data sheet: D4 cyclomethicone.			
HERO ID:	7311162			
Conditions of Use:	All (PPE/Glove data)			
EXTRACTION				
Parameter	Data			
Personal protective equipment:	Full contact glove material: Nitrile rubberMinimum layer thickness: 0.4 mmBreak through time: 480 minMaterial tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)Splash contact glove material: Nitrile rubberMinimum layer thickness: 0.11 mmBreak through time: 30 minMaterial tested: KCL 741 Dermatril® L			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Product is from a US supplier.	
	Metric 3: Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	Source is from 2023, which is less than 10 years old.	
	Metric 5: Sample Size	N/A	PPE data, no statistics necessary.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	SDS provides an example material that was tested, but no further details on how PPE selection was made.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing PPE for full contact and splash contact. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	U.S. BLS, (2023). U.S. Census Bureau of Labor Statistics Data from 2021.			
HERO ID:	11138808			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Number of workers:		Used to develop a method to estimate number of workers.		
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	BLS is expected to use reliable survey methods.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	U.S. based economic data.
	Metric 3:	Applicability	High	These economic data cover all industry and occupation types in scope for all chemicals.
	Metric 4:	Temporal Representativeness	High	The BLS OES data are from 2021.
	Metric 5:	Sample Size	High	The BLS OES program provides detailed statistics and estimated relative standard error for each state, industry, and occupation survey conducted (https://www.bls.gov/oes/current/oes_research_estimates.htm).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	BLS documents results and methods, but underlying survey results not accessible.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Limited discussion of variability and uncertainty in results.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2020). 2020 CDR: Commercial and consumer use.			
HERO ID:	10366189			
Conditions of Use:	Manufacture and Import			
EXTRACTION				
Parameter	Data			
Number of workers:	Provides number of workers.			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1: Methodology	High	EPA is a trusted source.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	CDR is U.S. based data.	
	Metric 3: Applicability	High	CDR covers chemical manufacturers and importers, which are in scope for all chemicals.	
	Metric 4: Temporal Representativeness	High	Data is less than 10 years old.	
	Metric 5: Sample Size	Medium	Number of worker distributions may be reported as a range or threshold amount.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Submissions do not include method of how number of workers were determined.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	CDR data do not address variability or uncertainty in submitter provided data.	
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2013). Updating CEB’s method for screening-level estimates of dermal exposure.			
HERO ID:	11224653			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Document published by EPA CEB.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are applicable to all COUs involving dermal contact.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	N/A	N/A - Document describes general dermal exposure parameters. Sample size is not applicable.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by describing dermal exposure parameters for different exposure scenarios but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.			
HERO ID:	6311218			
Conditions of Use:	Plastics Processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	A. Exposure to solid or liquids during unloading of additives from transport container andcharging additives to operation.B. Exposure to liquids during equipment cleaning of compounding equipment.C. Exposure to solids during filling containers with compounded plastic resin.			
Exposure route:	Dermal			
Physical form:	Liquid, solid			
Dermal exposure data:	Dermal exposure data			
Number of workers:	25,557 workers. (P. 2/18)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods. Kirk-Othmer and AP-42.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States.	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2016). Chemical Data Reporting (CDR): Complete 2016 submissions.			
HERO ID:	7315471			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Physical form:	Out of the 8 sites that reported to CDR for D4, 1 site used it as a dry powder, 3 sites used it as a liquid, and 4 sites claimed CBI/withheld.			
Number of workers:	Out of the 8 sites that reported to CDR for D4, 1 site had at least 10 but fewer than 25 workers, 1 site had at least 50 but fewer than 100 workers, 1 site had at least 100 but fewer than 500 workers, 2 sites were unknown, and 3 sites claimed CBI/withheld.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed by listing ranges for reported values. Variability isn't addressed.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2016). Chemical Data Reporting (CDR): Complete 2016 submissions.			
HERO ID:	7315471			
Conditions of Use:	Commercial/Consumer Use			
EXTRACTION				
Parameter	Data			
Physical form:	Out of the 13 sites that reported to CDR for D4, 1 site used it as a dry powder, 7 sites used it as a liquid, and 5 sites claimed CBI/withheld.			
Number of workers:	Out of the 13 sites that reported to CDR for D4, 1 site had at least 10 but fewer than 25 workers, 5 sites had at least 50 but fewer than 100 workers, 1 site had at least 100 but fewer than 500 workers, 3 sites were unknown, and 3 sites claimed CBI/withheld.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty is addressed by listing ranges for reported values. Variability isn't addressed.	
Overall Quality Determination		High		

Study Citation:		U.S. EPA, (2016). Chemical Data Reporting (CDR): Complete 2016 submissions.		
HERO ID:		7315471		
Conditions of Use:		Industrial Processing/Use		
EXTRACTION				
Parameter		Data		
Physical form:		Out of the 21 sites that reported to CDR for D4, 1 site used it as a dry powder, 15 sites used it as a liquid, and 5 sites claimed CBI/withheld.		
Number of workers:		Out of the 21 sites that reported to CDR for D4, 5 site had at least 10 but fewer than 25 workers, 7 sites had at least 50 but fewer than 100 workers, 3 sites had at least 100 but fewer than 500 workers, 2 sites were unknown, and 4 sites claimed CBI/withheld.		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness		Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
		Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
		Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.
		Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
Domain 3: Accessibility/ Clarity		Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty		Metric 7: Metadata Completeness	Medium	Uncertainty is addressed by listing ranges for reported values. Variability isn’t addressed.
Overall Quality Determination			High	

Study Citation:	AS., COWI (2018). Screening programme 2017: Suspected PBT compounds.			
HERO ID:	7303021			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	Effluent and runoff from 2 wastewater treatment plants (VEAS & HIAS), 2 landfill and wastewater treatment facilities (ROAF & LINDUM), and three buildings in Norway.			
Release quantity:	Annual water discharge from VEAS is 100-110 million m3.			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
Comments:	water samples of municipal wastewater and run-off water from landfill pg. 76/118passive sampling POCIS in municipal wastewater and in runoff water from landfill pg. 83/118sediment pg. 89/118			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Methodology is known and expected to be accurate and cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Norway, an OECD country.
	Metric 3:	Applicability	High	Data are for the disposal of D4, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination			High	

Study Citation:	Brooke, D. N., Crookes, M. J., Gray, D., Robertson, S. (2009). Environmental risk assessment report: Decamethylcyclopentasiloxane.
HERO ID:	7330442
Conditions of Use:	All- generic

EXTRACTION	
Parameter	Data
Description of release source:	The main uses of D5 are as an intermediate for the production of other chemicals (silicone polymers), in personal care products (e.g. cosmetic products and skin- and hair-care products), in household products, and in industrial/institutional cleaning. Use as an intermediate in the formation of silicone polymers effectively consumes the D5, although trace amounts in the final products can be subsequently released to the environment. Use of D5 in personal care and household products results in widespread exposure to the environment.
Release quantity:	Default release estimate• The emissions from the UK production site can be estimated using the A and B Tables from the TGD. The relevant emission factors (taken from Table A1.1 or Table A2.2) for main category {(MC) = 1c – (isolated intermediates stored offsite)} D5 are:0.0001 (0.01 per cent) to air• 0.003 (0.3 per cent) to wastewater.Use as a chemical intermediate off-site:Based on these figures, for D5 the emissions to water after waste treatment at the actual UK plant can be estimated using the appropriate effluent flows as of the order 0.0024–0.0084kg/day. These data are based on measurements taken around 2001. Using the 2001 production data for this site (confidential), an appropriate emission factor for D5 was derived and applied to the 2004 consumption data (details of the calculation are given in the confidential annex). This was used to estimate the current emission of D5 from the UK production site (after wastewater treatment) as 3.1 kg/year or 0.010 kg/day.The emission estimates for local D5 to air used in this assessment are:• confidential to air• 3.1 kg/year or 0.010 kg/day to surface water.Use in personal care products:Using this value and the above default emission factors, the emissions of D5 from formulation can be estimated as• local, generic site – 51 kg/year or 0.17 kg/day to air and 230 kg/year or 0.77 kg/day to wastewater• total UK emission – 798 kg/year to air and 3948 kg/year to wastewater• regional – 315 kg/year to air and 1557 kg/year to wastewater• total EU emission – 3,149 kg/year to air and 15,570 kg/year to wastewater.Household products:Confidential information was used to estimate the release of D5 from household products. The local release to wastewater was estimated at around 6.0×10^{-3} kg/day for this scenario.Use in industrial/institutional cleaning:The local emission to wastewater is estimated at around 8.5×10^{-8} kg/day (i.e.negligible). Emissions to air can also occur (estimated to be around 0.33 kg/day as a worstcase at a local site).
Release or emission factors:	Release or emission factors
Release frequency:	The number of days of emission is 300. (Page 39/223)
Comments:	See more details in Table 3.5 Summary of emission estimates for D5

		EVALUATION	
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High
			The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium
	Metric 3:	Applicability	Medium
			The data are from an OECD country other than the U.S
	Metric 4:	Temporal Representativeness	Medium
	Metric 5:	Sample Size	High
			he release data are for an occupational scenario within the scope of the risk evaluation. Not Specific to D4. D5 data is expected to be relevant for D4.
			more than 10 years but no more than 20 years old.
			Statistical distribution of samples is fully characterized. Sample size is sufficiently representative

Domain 3: Accessibility/ Clarity
Continued on next page ...

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Study Citation:	Brooke, D. N., Crookes, M. J., Gray, D., Robertson, S. (2009). Environmental risk assessment report: Decamethylcyclopentasiloxane.
HERO ID:	7330442
Conditions of Use:	All- generic

Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 6:	Metadata Completeness	High	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty				
	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.

Overall Quality Determination

High

Study Citation:	CEPE, (2020). SpERC fact sheet: Industrial application of coatings by spraying.			
HERO ID:	10442901			
Conditions of Use:	Paint and Coatings			
EXTRACTION				
Parameter	Data			
Release or emission factors:	Release or emission factors			
Release frequency:	Item '5.2 Days emitting' states that the 'Number of emission days per year: numerical value' is 'Continuous release: 225 d/y'			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
Comments:	Background information found at https://echa.europa.eu/documents/10162/8718351/cepe_sperc_background_document_application_of_coatings_aug18_updated_en.pdf/6265d902d-3bef-c17b-8c908f26eec6?t=1611056681505			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The release data methodology is known for some estimates (from OECD ESD) while others had no OECD ESD- industry data, which were assumption.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country(EU) other than the U.S.
	Metric 3:	Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation (Use of Paints and Coatings) but is not chemical specific.
	Metric 4:	Temporal Representativeness	High	Release data are generally no than 10 years old.
	Metric 5:	Sample Size	Low	Emission factors were not characterized by statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study addresses variability in the determinants of release(considers volatility and product). The release data study does not address uncertainty in the release results.
Overall Quality Determination		Medium		

Study Citation:	CEPE, (2020). SpERC fact sheet: Professional application of coatings and inks by spraying.			
HERO ID:	10442902			
Conditions of Use:	Paints and coatings, Ink, toner, and colorant products			
EXTRACTION				
Parameter	Data			
Description of release source:	Professional application of coatings and inks by spraying			
Release or emission factors:	Release or emission factors			
Release frequency:	Indoor: 365 days/yrOutdoor: 225 days/yr			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation but data is general and not specific to the chemical.
	Metric 4:	Temporal Representativeness	High	Fact sheet is from 2020.
	Metric 5:	Sample Size	Low	Emission factors were not characterized by statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by including emission factors for different processes, but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	EC/HC, (2008). Screening assessment for the challenge: Octamethylcyclotetrasiloxane (D4): CASRN 556-67-2.			
HERO ID:	6993847			
Conditions of Use:	Processing (personal care products)			
EXTRACTION				
Parameter	Data			
Description of release source:	The principal sources of release of D4 to the environment are industrial processes in which it is reacted to form silicone polymers, from blending, formulation and packaging operations. It is also released from the use and disposal of personal care products.			
Release or emission factors:	Release or emission factors			
Comments:	Lots of very general info that is applicable to multiple COUs is in the "Releases to the Environment" section starting on pg. 14.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Methodology is known and expected to be accurate and cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Canada, an OECD country.
	Metric 3:	Applicability	Low	The release data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a workerscenario
	Metric 4:	Temporal Representativeness	Medium	Data are greater than 10 years old but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (percentages) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release media and emission factors provided but missing release quantity and frequency, and waste treatment methods.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed by describing the estimations and assumptions used in the mass flow tool. Variability is not addressed.
Overall Quality Determination		Medium		

Study Citation:	ECCC, (2017). Final performance report: Pollution prevention planning and siloxane D4 (2013-2017).			
HERO ID:	7316876			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	Any facility that, "a) It manufactures or uses D4, or a mixture containing D4, where the total quantity of D4 manufactured or used is equal to or greater than 100 kg per calendar year; andb) As a result of manufacture or use of D4 or a mixture containing D4, it releases an effluent containing D4 at any final discharge point of the facility"			
Release quantity:	2013: 227 (kg); 2017: 101 (kg)			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
Comments:	This is more of an overview of actions taken by the Canadian govt			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	Methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the Canada, an OECD country.
	Metric 3:	Applicability	High	Data are for disposal, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release media and release frequency provided but missing emission factors, waste treatment methods.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by showing releases from 2013 and 2017, but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	ECHA, (2016). Opinion on an annex XV dossier proposing restrictions on octamethylcyclotetrasiloxane, decamethylcyclopentasiloxane.			
HERO ID:	9644524			
Conditions of Use:	Industrial Use of Processing Aids (specifically anti-foaming agents)			
EXTRACTION				
Parameter	Data			
Release quantity:	Pg. 16/28: Emissions to surface waters from “other” uses (i.e. anti-foam applications in the pulp and paper, detergents and the oil and gas industry) are estimated to be <1 tonne/year for D4 and < 1 tonne/year for D5, despite the use of a conservative emission factor to wastewater of 100%.			
Comments:	This data source contains mainly data pertaining to wash-off and leave on personal care products that contain D4 and D5. Such products are out-of-scope of the D4 RE.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	The release data method is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data pertains to the EU.
	Metric 3:	Applicability	High	The data pertain to the industrial use of anti-foaming agents. Even though this is not explicitly stated as a COU, such use must occur given that processing for incorporation into processing aids (anti-foaming agents) is a COU.
	Metric 4:	Temporal Representativeness	High	Data is less than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release.
Overall Quality Determination		Medium		

Study Citation:	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.
HERO ID:	7349020
Conditions of Use:	Processing as a Reactant (Plastic Material and resin manufacturing)

EXTRACTION	
Parameter	Data
Description of release source:	The primary sources of emissions at plastic products manufacturing facilities are the pieces of equipment (e.g., extruder hopper, die head, sander) used to handle raw materials and produce the final product. These are typically the locations where chemical reactions occur, liquid solvents and solvent blends are exposed to the atmosphere, solid resin is heated and melted, and additives are introduced. In addition to emissions generated directly from primary production processes associated with plastic products manufacturing, there may be additional emissions produced by secondary processes at these facilities. Emission sources from these secondary processes include storage tanks, equipment leaks, wastewater treatment, combustion sources, and cleaning and surface coating operations. (p. 17)
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation however it is not chemical specific.
	Metric 4:	Temporal Representativeness	Low	Data is over 20 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.

Overall Quality Determination

Medium

Study Citation:	ERM, (2012). D4 and d5 conceptual site models and mass balance report.			
HERO ID:	6998155			
Conditions of Use:	Disposal- POTW			
EXTRACTION				
Parameter	Data			
Description of release source:	Air, liquid, and solid waste streams in POTW			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
Comments:	general information on waste treatments methods at POTW, not information as part of the survey.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Methodology is known and expected to be accurate and cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for disposal, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	Low	% removal is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources(e.g., % removal from Canada report) are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by discussing multiple treatment methods, but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation: ERM, (2012). D4 and d5 conceptual site models and mass balance report.
HERO ID: 6998155
Conditions of Use: Processing- Formulation

EXTRACTION

Parameter	Data
Description of release source:	Volatile emissions, fugitive emissions from storage tanks, pumps or valves, wastewater during mixing and solid waste during mixing and packaging (pg. 17).
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	U.S. data
	Metric 3: Applicability	High	within the scope of the risk evaluation
	Metric 4: Temporal Representativeness	High	The operations, equipment, and worker activities associated with the data indicate that the data should be representative of current operations, equipment, and activities. No more than 10 years old.
	Metric 5: Sample Size	N/A	Qualitative information
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Release data include release media; process, unit operation, or activity that is the source of the release; but not release frequency, quantity or emission factors.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The release data addresses variability in the determinants of release. The release data provides only limited discussion of the uncertainty in the release results.

Overall Quality Determination

High

Study Citation:	ERM, (2012). D4 and d5 conceptual site models and mass balance report.			
HERO ID:	6998155			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Description of release source:	volatile emissions, fugitive emissions, wastewater, solid waste			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	U.S. data
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The operations, equipment, and worker activities associated with the data indicate that the data should to be representative of current operations, equipment, and activities. The data are generally no more than 10 years old.
	Metric 5:	Sample Size	N/A	Qualitative information
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Release data include release media and source of the release; but not release quantities, emission factors or release frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data addresses variability in the determinants of release. The release data provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination			High	

Study Citation:	ERM, (2012). D4 and d5 conceptual site models and mass balance report.			
HERO ID:	6998155			
Conditions of Use:	Processing- Polymerization			
EXTRACTION				
Parameter	Data			
Description of release source:	stack and fugitive emissions, wastewater and stormwater, and solid waste.			
Release quantity:	Table 5 (pg. 38) lbs/yr values for waste streams: point source emissions- 91,626, fugitive air emissions-3,051, industrial discharge to POTW or surface water-2,094, stormwater discharge to surface water-253, solid waste disposal to off-site waste management-131,585			
Release or emission factors:	nan			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The operations, equipment, and worker activities associated with the data indicate that the data should be representative of current operations, equipment, and activities. The data are generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a mean with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release data include most critical metadata, including release media and release source, but lacks additional metadata, release frequency
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The release data study addresses variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination		High		

Study Citation:	Koh, S. H., Shaw, A. R. (2015). Gaseous emissions from wastewater facilities. Water Environment Research 87(10):1167-1177.			
HERO ID:	6835656			
Conditions of Use:	Waste handling, treatment and disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	Waste water treatment plant			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	The methodology is not specified just process and results.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from Singapore , a non-OECD country.
	Metric 3:	Applicability	High	Data are for waste handling, treatment, and disposal, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	Low	characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release media and treatment method is provided but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability was addressed by identifying two different methods of waste treatment, but uncertainty was not discussed.
Overall Quality Determination		Medium		

Study Citation:	Madi, H., Diethelm, S., Poitel, S., Ludwig, C., Herle, Van, J. (2015). Damage of siloxanes on Ni-YSZ anode supported SOFC operated on hydrogen and bio-syngas. Fuel Cells 15(5):718-727.			
HERO ID:	6835747			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	sewage/landfill biogas			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	nan			
Comments:	media: water, land			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Switzerland, an OECD country.
	Metric 3:	Applicability	High	Data are for disposal, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by factoring different seasons/sites, but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	NICNAS, (2020). Cyclic volatile methyl siloxanes: Environment tier II assessment.			
HERO ID:	6996262			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	"Emissions to the air compartment can be from diffuse sources such as uses of cosmetics and personal care products in domestic situations. Diffuse emissions may also occur as a result of the thermal degradation of silicone fluids, or from the release of residual cyclic dimethyl siloxane oligomers that are present in silicone products and articles. Emissions also occur from multiple point sources such as STPs and landfills. Cyclic volatile methyl siloxanes are also washed down the drain into waste water from the use of some personal care and cleaning products in domestic situations. The subsequent treatment of this domestic waste water in STPs is a major pathway for the emission of these chemicals to surface waters, sediments and soil"			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Methodology is known and expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Australia, an OECD country,
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (percentages) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release media and emission factors provided but missing release quantity and frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by compiling results from different studies. Uncertainty isn't addressed.
Overall Quality Determination		Medium		

Study Citation:	Nusz, J. B., Fairbrother, A., Daley, J., Burton, G. A. (2018). Use of multiple lines of evidence to provide a realistic toxic substances control act ecological risk evaluation based on monitoring data: D4 case study. Science of the Total Environment 636:1382-1395.			
HERO ID:	6833944			
Conditions of Use:	Manufacture, processing as a reactant			
EXTRACTION				
Parameter	Data			
Description of release source:	Manufacturing, processing, and formulating facilities and industrial end users			
Comments:	MPF facilities discharging to a municipal WWTP, which then dischargesto a surface water body.Down the drain releases from consumer products to a municipal- WWTP, which then discharges to a surface water body.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Methodology is known and expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for manufacturing and processing as a reactant, an in-scope occupational sce- nario.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Release media provided but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The release data study does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Oshita, K., Fujime, M., Takaoka, M., Fujimori, T., Appels, L., Dewil, R. (2015). Siloxane removal and sludge disintegration using thermo-alkaline treatments with air stripping prior to anaerobic sludge digestion. Energy Conversion and Management 96:384-391.			
HERO ID:	6835790			
Conditions of Use:	Waste handling, treatment and disposal			
EXTRACTION				
Parameter	Data			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Japan, an OECD country
	Metric 3:	Applicability	High	Data are for waste handling, treatment, and disposal, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Data is recent, within the last 10 years
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination			High	

Study Citation:	SEHSC, (2008). Comments on Health and Environment Canada's draft screening assessments for octamethylcyclotetrasiloxane (D4; CAS No. 556-67-2), Canada Gazette, part I, volume 142 no. 20 (May 17, 2008).
HERO ID:	7346551
Conditions of Use:	manufacturing

Parameter	Data
Description of release source:	The release of D4 from PDMS manufacture. There may be de novo synthesis of D4 occurring in landfills and agricultural lands where sewage sludge containing PDMS is spread
Release or emission factors:	nan
Comments:	Results of multimedia modeling of D4 as reported in the Draft Screening AssessmentReport for D4 (media specific half-lives not identified). (P. 13/118)

Domain	Metric	EVALUATION Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release.

Overall Quality Determination

High

Study Citation:	Tang, X., Misztal, P. K., Nazaroff, W. W., Goldstein, A. H. (2015). Siloxanes are the most abundant volatile organic compound emitted from engineering students in a classroom. Environmental Science & Technology Letters 2(11):303-307.			
HERO ID:	3449377			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Description of release source:	Exhaled breath of students in classroom			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Uninformative	Data are for emissions from consumers who have used personal care products containing these chemicals. Not in scope for engineering assessors.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample type and exposure type provided but missing release quantity, release frequency, waste treatment methods and pollution control.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by multiple sampling events at different dates, but uncertainty is not addressed.
Overall Quality Determination			Uninformative	

Study Citation:	U.S. EPA, (1995). AP-42: Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition.			
HERO ID:	46492			
Conditions of Use:	Intermediates in rubber product manufacturing			
EXTRACTION				
Parameter	Data			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The AP-42 methodology is known and expected to be accurate.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States	
	Metric 3: Applicability	Medium	The manufacture of engineered rubber products (which are non-tire products) is a COU but the data in general are associated with not only engineered rubber products but also rubber tire manufacture. Not Specific to D4.	
	Metric 4: Temporal Representativeness	Medium	The data were collected during the period of 1987 - 1999 but were published in 2008 and therefore are considered to be valid as of 2008 and hence are less than 20 years old. There is a NESHAP for rubber tire manufacture but not for rubber product manufacture in general. The emission factors are published as draft and not final AP-42 factors.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Meta data include release media, processing step (release source) process conditions, and release frequency but do not include release duration (number of release days.)	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The release data study does not address variability or uncertainty.	
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (1995). AP-42: Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition.			
HERO ID:	46492			
Conditions of Use:	Processing /incorporation into an article/plasticizers in adhesive manufacturing.			
EXTRACTION				
Parameter	Data			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The AP-42 methodology is known and expected to be accurate.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States	
	Metric 3: Applicability	Medium	The manufacture of engineered rubber products (which are non-tire products) is a COU but the data in general are associated with not only engineered rubber products but also rubber tire manufacture. Not Specific to D4.	
	Metric 4: Temporal Representativeness	Medium	The data were collected during the period of 1987 - 1999 but were published in 2008 and therefore are considered to be valid as of 2008 and hence are less than 20 years old. There is a NESHAP for rubber tire manufacture but not for rubber product manufacture in general. The emission factors are published as draft and not final AP-42 factors.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Meta data include release media, processing step (release source) process conditions, and release frequency but do not include release duration (number of release days.)	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The release data study does not address variability or uncertainty.	
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (1995). AP-42: Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition.			
HERO ID:	46492			
Conditions of Use:	Processing- Plastic resins and plastic products.			
EXTRACTION				
Parameter	Data			
Description of release source:	Ch4.4: Organic vapors consisting of volatile organic compounds (VOC) are emitted from fresh resin surfaces during the fabrication process, and from the use of solvents (usually acetone) for cleanup of hands, tools, molds, and spraying equipment. Cleaning solvent emissions can account for over 36 percent of the total plant VOC emissions. There may also be some release of particulate emissions from automatic fiber chopping equipment, but these emissions have not been quantified. Organic vapor emissions from polyester resin/fiberglass fabrication processes occur when the cross-linking agent (monomer) contained in the liquid resin evaporates into the air during resin application and curing. Styrene, methyl methacrylate, and vinyl toluene are 3 of the principal monomers used as cross-linking agents. Styrene is by far the most common. Other chemical components of resins are emitted only at trace levels because they not only have low vapor pressures, but also are substantially converted to polymers.			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The AP-42 methodology is known and expected to be accurate.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States
	Metric 3:	Applicability	Medium	The manufacture of engineered rubber products (which are non-tire products) is a COU but the data in general are associated with not only engineered rubber products but also rubber tire manufacture. Not Specific to D4.
	Metric 4:	Temporal Representativeness	Medium	The data were collected during the period of 1987 - 1999 but were published in 2008 and therefore are considered to be valid as of 2008 and hence are less than 20 years old. There is a NESHAP for rubber tire manufacture but not for rubber product manufacture in general. The emission factors are published as draft and not final AP-42 factors.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Meta data include release media, processing step (release source) process conditions, and release frequency but do not include release duration (number of release days.)
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.
HERO ID:	6311218
Conditions of Use:	Plastics Processing

EXTRACTION

Parameter	Data
Description of release source:	1. Container residue from additive transport container released to water, incineration, or landfill.2. Dust generation from transferring/compounding released to water or landfill.3. Fugitive air emissions from compounding/shaping released to water or air.4. Equipment cleaning and cooling water from compounding released to water.
Release or emission factors:	Release or emission factors
Release frequency:	CEB standard assumption, 250 days per year, based on five day work week and two weeks per year of operation shut down.
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The release data study addresses variability in the determinants of release. The release data study addresses uncertainty in the release results.

Overall Quality Determination

High

Study Citation:	U.S. EPA, (1995). Chapter 6.4: Paint and varnish. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.
HERO ID:	7315881
Conditions of Use:	Paints and coatings

EXTRACTION

Parameter	Data
Description of release source:	Pg. 1/2: "The primary factors affecting emissions from paint manufacture are care in handling dry pigments, types of solvents used, and mixing temperature. Varnish cooking emissions, largely in the form of volatile organic compounds, depend on the cooking temperatures and times, the solvent used, the degree of tank enclosure and the type of airpollution controls used."
Release quantity:	In the case of varnish, "Varnish cooking emissions, largely in the form of volatile organic compounds, depend on the cooking temperatures and times, the solvent used, the degree of tank enclosure and the type of air pollution controls used."
Release or emission factors:	Release or emission factors
Waste treatment methods and pollution control:	nan

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site. AP-42
Domain 2: Representativeness	Metric 2: Geographic Scope	High	US data
	Metric 3: Applicability	High	Paints and coatings is a COU
	Metric 4: Temporal Representativeness	Low	Data is more than 20 years old. Data may not be currently applicable.
	Metric 5: Sample Size	Medium	Ranges of values of quantitative data are given.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release media and release sources are given but release frequency is not.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability in release determinants and uncertainty in results not addressed.

Overall Quality Determination

Medium

Study Citation:	U.S. EPA, (1995). AP-42: Chapter 11.2 - Asphalt roofing.			
HERO ID:	7315991			
Conditions of Use:	Asphalt paving, roofing, and coating materials manufacturing			
EXTRACTION				
Parameter	Data			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	The data were collected before the most recent federal regulatory action or update or are more than 20 years old if no federal regulation is established. The operations, equipment, and worker activities are not available or indicate that the associated data are expected to be outdated.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release data include critical metadata, including release media and process information, but lacks additional metadata, such as release frequency
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The study addresses variability in control technologies used, but does not address uncertainty
Overall Quality Determination			Medium	

Study Citation:	Wacker Chemical Corporation, (2017). RE: TSCA 8(e) submission: Environmental monitoring for octamethylcyclotetrasiloxane (D4) (CASRN 556-67-2).			
HERO ID:	7310129			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	Facility effluent (aerial view of facility provided 3/6)			
Release or emission factors:	Release or emission factors			
Comments:	Sediment sampling provided as well, pg. 1/6			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	Methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for disposal, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Release media provided but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium		

Study Citation:	Wang, G., Zhang, Z., Hao, Z. (2019). Recent advances in technologies for the removal of volatile methylsiloxanes: A case in biogas purification process. Critical Reviews in Environmental Science and Technology 49(24):2257-2313.			
HERO ID:	6836163			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	VMS are produced mainly during the process of anaerobic digestion (pg. 8)			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	The data are from a non-OECD country
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Data is recent and the operations, equipment, and worker activities associated with the data indicate that the data should to be representative of current operations, equipment, and activities.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination		Medium		

Study Citation:	Xu, L., Huang, Z., Zhang, Q., Xiang, X., Zhang, S., Cai, Y. (2020). Methylsiloxanes and their brominated products in one e-waste recycling area in china: emission, environmental distribution, and elimination. Environmental Science & Technology 54(7):4267-4274.			
HERO ID:	6836349			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	During e-waste recycling, PWBs often undergo thermal processes (burning and pyrolysis) to remove small electronic components (cell batteries, resistors, and capacities, etc.). These thermal processes could significantly accelerate depolymerization of PDMS leading to the generation of cVMS.			
Release quantity:	50 million tonnes of e-waste generated in 2016			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from China, a non-OECD country
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Data is less than 10 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination		Medium		

Study Citation:	Brooke, D. N., Crookes, M. J., Gray, D., Robertson, S. (2009). Environmental risk assessment report: Octamethylcyclotetrasiloxane.			
HERO ID:	6994688			
Conditions of Use:	Processing: Use as a chemical intermediate			
EXTRACTION				
Parameter	Data			
Description of release source:	Use as a chemical intermediate off-site			
Release or emission factors:	Release or emission factors			
Release frequency:	The number of days of emission for the local site is 13 days (UK) and 300 (EU)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the United Kingdom, an OECD country.	
	Metric 3: Applicability	High	Data are for processing, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	Medium	Assessment is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.	
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Medium		

Study Citation:	Brooke, D. N., Crookes, M. J., Gray, D., Robertson, S. (2009). Environmental risk assessment report: Octamethylcyclotetrasiloxane.			
HERO ID:	6994688			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Description of release source:	UK production site			
Release quantity:	To Water: 23.4 kg/year			
Release or emission factors:	Release or emission factors			
Release frequency:	The number of days of emission is 300.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the United Kingdom, an OECD country.
	Metric 3:	Applicability	High	Data are for manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Assessment is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Capela, D., Alves, A., Homem, V., Santos, L. (2016). From the shop to the drain - Volatile methylsiloxanes in cosmetics and personal care products. Environment International 92-93(Elsevier):50-62.			
HERO ID:	5427151			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Release quantity:	Document gives release quantity amounts on PDF pg. 60, however, they are total amounts for all siloxanes			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from a frequently used source (e.g., European Union or OECD reports, NIOSH HHEs, journalarticles, Kirk-Othmer) and are generally accepted by the scientific community, and associated information does not indicate flaws or quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Portugal, an OECD country.
	Metric 3:	Applicability	Uninformative	Data are for consumer down the drain estimates, which are not occupational scenario or useful in releases from occupational scenarios.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by sampling multiple products, but uncertainty is not addressed.
Overall Quality Determination			Uninformative	

Study Citation:	Co.,, S.H. (1986). Environmental risk assessment for octamethylcyclotetrasiloxane (OMCTS).			
HERO ID:	5889398			
Conditions of Use:	Silicone processors (intermediate) / plastics material and resin manufacturing			
EXTRACTION				
Parameter	Data			
Description of release source:	"small quantities of OMCTS are lost in the scrubbing of process vents" (pg 14)			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
Comments:	Release media: "Wastewater is recycled or treated on-site, and solid waste is incinerated or landfilled"; "The most probable release of OMCTS during industrial applications is to the atmosphere because of the chemical's high volatility. " (pg 15-17)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for PROC, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (ranges, assumed means) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by evaluating multiple sites and industries, but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	Co., S.H. (1986). Environmental risk assessment for octamethylcyclotetrasiloxane (OMCTS).			
HERO ID:	5889398			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:		”After finding organosilicons in wastewater treatment effluent and sludge, and in river sediments nearby, Pellenbarg <1979a> suggested that antifoam agents containing OMCTS being used in wastewater treatment might be the source of these silicones.”; this was not corroborated, source states that D4 antifoaming agents are too expensive for this use compared to alternatives (pg 17).		
Release or emission factors:		Release or emission factors		
Waste treatment methods and pollution control:		Waste treatment methods and pollution control		
Comments:		media: water		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for disposal, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (ranges, assumed means) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by evaluating multiple sites and industries, but uncertainty is not addressed.
Overall Quality Determination			Medium	

Octamethylcyclotetrasiloxane (D4)

Environmental Releases

HERO ID: 5884316 Table: 1 of 1

Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.			
HERO ID:	5884316			
Conditions of Use:	Personal care products (barbers and beauticians)			
EXTRACTION				
Parameter	Data			
Waste treatment methods and pollution control:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Uninformative	Data are for use of personal care products, which is not in-scope (FDA use)
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed by considering a worst case loading scenario. Variability is not addressed.
Overall Quality Determination		Uninformative		

Study Citation:	OECD, (2021). Emission scenario document on the use of vapour degreasers.			
HERO ID:	12392017			
Conditions of Use:	Use of Solvents			
EXTRACTION				
Parameter	Data			
Description of release source:	Section 2 provides descriptions of various types of degreasing operations, Section 2.4 identifies common activities that releases and exposures are expected to occur			
Release or emission factors:	Release or emission factors			
Release frequency:	default 296 operating days a year			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS/ESD is based on U.S. data.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.
Overall Quality Determination			High	

Study Citation:	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.			
HERO ID:	3808976			
Conditions of Use:	Automotive Coating Application			
EXTRACTION				
Parameter	Data			
Description of release source:	Container cleaning, equipment cleaning, coating application (overspray)			
Release or emission factors:	nan			
Release frequency:	250 days/yr			
Waste treatment methods and pollution control:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3:	Applicability	Medium	Data is for multiple in-scope occupational scenarios; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	2011 ESD which utilizes information prior to that time.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple coating types.
Overall Quality Determination		High		

Study Citation:	OECD, (2009). Emission scenario document on adhesive formulation.
HERO ID:	3827299
Conditions of Use:	Processing

EXTRACTION

Parameter	Data
Description of release source:	Container cleaning, dusts and volatiles from unloading containers, vented losses during mixing, sampling, equipment cleaning, volatiles from loading containers, off-spec products
Release quantity:	Provides models for estimating various fugitive air releases
Release or emission factors:	Release or emission factors
Release frequency:	days/yr equal to number of bt/yr
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Medium	Data characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions and types of adhesives.

Overall Quality Determination**High**

Study Citation:	OECD, (2011). Emission scenario document on the use of metalworking fluids.			
HERO ID:	3827418			
Conditions of Use:	Use of Degreasing Solvents			
EXTRACTION				
Parameter	Data			
Description of release source:	Provides process steps that may result in releases, also provides possible media of release for these steps.			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.	
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.	
Overall Quality Determination		High		

Study Citation:	OECD, (2015). Emission scenario document on use of adhesives.			
HERO ID:	3833136			
Conditions of Use:	Adhesive Application			
EXTRACTION				
Parameter	Data			
Description of release source:	container cleaning, unloading, equipment cleaning, application losses, curing/drying, trimming			
Release or emission factors:	nan			
Release frequency:	50-365 days/yr			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
Comments:	media: water, air, land			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions, types of adhesives, and end use markets.
Overall Quality Determination		High		

Study Citation:	OECD, (2011). Emission scenario document on radiation curable coating, inks and adhesives.			
HERO ID:	3840008			
Conditions of Use:	Paint and coating manufacture			
EXTRACTION				
Parameter	Data			
Description of release source:	Container cleaning, dusts and volatiles from unloading containers, vented losses during mixing, sampling, equipment cleaning, volatiles from loading containers, filter wastes			
Release quantity:	Provides models for estimating various fugitive air releases			
Release or emission factors:	nan			
Release frequency:	250			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	2011 scenario document with data greater than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions and types of UV curable products.
Overall Quality Determination		High		

Study Citation:	OECD, (2004). Emission scenario document on additives in rubber industry.			
HERO ID:	4445826			
Conditions of Use:	Rubber Manufacturing			
EXTRACTION				
Parameter	Data			
Description of release source:	Page 21 to 32 describes the various release sources (and how to estimate them), including releases to wastewater, air, and soil due to formulation and processing, and releases due to use of rubber products			
Release quantity:	Total WW flow rates (m3/day) from a generic point source (determined with data from 84 companies): 10-1,154, mean = 184, 90th percentile = 438 (See table 7 on page 23 of 39).			
Release or emission factors:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Low	Assessment from 2004 but is based on data greater than 20 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by presenting emission factors for multiple scenarios/additive types but uncertainty is not addressed.	
Overall Quality Determination		Medium		

Study Citation:	OECD, (2011). Emission scenario document on the chemicals used in water-based washing operations at industrial and institutional laundries.
HERO ID:	6387321
Conditions of Use:	Use of laundry products (industrial and institutional)

EXTRACTION

Parameter	Data
Description of release source:	Figure 0-1 provides a process flow diagram with the following exposure points: - Transport container residue released to water, incineration, or landfill.- Open surface losses to air during transport container cleaning (if containers cleaned on-site; volatile chemicals only).- Transfer operation losses to air from unloading and transferring laundry cleaning product (volatile chemicals only).- Dust losses during unloading and transferring solids (powdered laundry products only).- Releases to air within the workers' breathing zone from operations.- Washing water discharge to POTW (non-volatile and volatile chemicals) and evaporation losses to air during washing and drying operations (volatile chemicals only)
Release quantity:	Section 3 provides methodology to calculate release quantities
Release or emission factors:	Release or emission factors
Release frequency:	Up to 260 days
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS/ESD is based on U.S. data.
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The ESD is more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.

Overall Quality Determination

High

Study Citation:	OECD, (2009). Emission scenario document on transport and storage of chemicals.
HERO ID:	6393282
Conditions of Use:	Transportation and Storage

EXTRACTION

Parameter	Data
Description of release source:	filling and emptying of containers, storage, pipelines, washing and cleaning, recycling and disposal of packaging
Release or emission factors:	Release or emission factors
Waste treatment methods and pollution control:	nan
Comments:	media: water, air, land

EVALUATION

Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	2009 scenario document which includes data greater than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple chemical forms, containers and storage system types.

Overall Quality Determination**Medium**

Study Citation:	OECD, (2015). Emission scenario document (ESD) on industrial use of industrial cleaners.			
HERO ID:	6414932			
Conditions of Use:	Cleaning and Degreasing Solvents			
EXTRACTION				
Parameter	Data			
Description of release source:	draggout, evaporation from openings of the washing tank, waste cleaning solution, drying			
Release quantity:	Provides methodology to estimate releases based on various parameters including: opening area of cleaning equipment, physical-chemical properties of cleaner, air velocity, etc.			
Waste treatment methods and pollution control:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Low	Methodology results characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple cleaner types
Overall Quality Determination		Medium		

Study Citation:	OECD, (2004). Emission scenario document on textile finishing industry.			
HERO ID:	6558533			
Conditions of Use:	Fabric, textile, and leather products not covered elsewhere			
EXTRACTION				
Parameter	Data			
Description of release source:	pre-treatment, residual padding liquors, residual printing pastes, and residual coating pastes, cleaning of the machines, singeing, heat setting, drying, printing, chemical finishing, mechanical finishing, coating, laminating			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple finishing agent types
Overall Quality Determination			Medium	

Study Citation:	OECD, (2009). Emission scenario documents on pulp, paper and board industry.		
HERO ID:	6558581		
Conditions of Use:	Processing: Incorporation into formulation, mixture, or reaction product (Other or Processing aid/antifoaming agent)		
EXTRACTION			
Parameter	Data		
Description of release source:	papermaking: stock preparation/process water recycling: alkaline hydrolysis, washing		
Release or emission factors:	Release or emission factors		
Comments:	pg. 75/137 provides a sample calculation using a defoamer as an example		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple chemical functions and paper products.
Overall Quality Determination		Medium	

Study Citation:	U.S. EPA, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	10368811			
Conditions of Use:	Use of Cleaning Products			
EXTRACTION				
Parameter	Data			
Description of release source:	Environmental Releases:1. Transfer operation losses of volatile liquids to fugitive air.2. Transfer operation losses of solids to fugitive air, POTW, or landfill.3. Container residuals to POTW or landfill.4. Release from application and use to: POTW or landfill (liquid formulations, non-spray application), 15% fugitive air and 85% POTW or landfill (liquid formulations, spray application), or POTW or landfill (solid formulations)			
Release or emission factors:	Release or emission factors			
Release frequency:	default operating days is 260			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.	
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2022). Commercial use of automotive detailing products - Generic scenario for estimating occupational exposures and environmental releases (Methodology review draft).			
HERO ID:	10480464			
Conditions of Use:	Commercial Use - Automotive detailing products			
EXTRACTION				
Parameter	Data			
Description of release source:	container unloading, container cleaning, application and use of automotive detailing productsRelease to: Water, air, landfill			
Release or emission factors:	nan			
Release frequency:	260 day/yr			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2023). Use of laboratory chemicals - Generic scenario for estimating occupational exposures and environmental releases (Revised draft generic scenario).			
HERO ID:	10480466			
Conditions of Use:	Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Description of release source:	Container unloading, container cleaning, labware equipment cleaning, during laboratory analyses, waste disposal.			
Release or emission factors:	Release or emission factors			
Release frequency:	260 day/yr.			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	11182966			
Conditions of Use:	Repackaging			
EXTRACTION				
Parameter	Data			
Description of release source:	Transfer losses, container cleaning, equipment cleaning, transfer losses during loading.			
Release quantity:	Provides methodology to estimate releases based on various parameters including: opening area of cleaning equipment, physical-chemical properties, air velocity, etc.			
Release or emission factors:	Release or emission factors			
Release frequency:	The number of operating days is given in a range of 174-260 days/yr with an EPA default of 260 days/yr.			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering emissions from multiple activities.
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2023). Methodology for estimating environmental releases from sampling waste (revised draft).			
HERO ID:	11373484			
Conditions of Use:	Manufacturing and Processing (Sampling Wastes)			
EXTRACTION				
Parameter	Data			
Description of release source:	most sampling releases were incinerated, a smaller portion indicated these releases may be to landfill, on-site wastewater treatment and discharge, or discharge to a publicly owned treatment works (POTW).			
Release or emission factors:	Release or emission factors			
Release frequency:	Occurs daily or with each batch			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS/ESD is based on U.S. data	
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2014). Formulation of waterborne coatings - Generic scenario for estimating occupational exposures and environmental releases -Draft.			
HERO ID:	3827197			
Conditions of Use:	Formulation of Paints and Coatings			
EXTRACTION				
Parameter	Data			
Description of release source:	container cleaning, equipment cleaning, transfer losses during loading/unloading, filtration.			
Release quantity:	Provides methodology to estimate releases based on various parameters including opening area of cleaning equipment, physical-chemical properties, air velocity, etc.			
Release or emission factors:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS is based on U.S. data	
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.			
HERO ID:	6549571			
Conditions of Use:	Rubber Converting			
EXTRACTION				
Parameter	Data			
Description of release source:	Table 4-1 (pg 42/108) provides the expected release source for each process step, the model used to estimate each release, and the possible media(s) of release			
Release quantity:	provides methods to estimate release quantity			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS is based on U.S. data.	
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Low	The completed exposure or risk assessment is more than 20 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.	
Overall Quality Determination		High		

Study Citation:	Brooke, D. N., Crookes, M. J., Gray, D., Robertson, S. (2009). Environmental risk assessment report: Octamethylcyclotetrasiloxane.		
HERO ID:	6994688		
Conditions of Use:	Personal care products		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	EU use: 892 tonnes (2003) 579 tonnes (2004)		
Life cycle description:	Life cycle diagram on PDF Pg. 31		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the United Kingdom, an OECD country.
	Metric 3: Applicability	Uninformative	Personal care products are not in scope for the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	Assessment is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by giving production volumes for multiple years but uncertainty is not addressed.
Overall Quality Determination		Uninformative	

Study Citation:	Brooke, D. N., Crookes, M. J., Gray, D., Robertson, S. (2009). Environmental risk assessment report: Octamethylcyclotetrasiloxane.		
HERO ID:	6994688		
Conditions of Use:	Synthetic rubber manufacturing		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	EU use: 5,771 tonnes (2003); 8,866 tonnes (2004)		
Life cycle description:	Life cycle diagram on PDF Pg. 31		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the United Kingdom, an OECD country.
	Metric 3: Applicability	High	Data are for synthetic rubber manufacturing, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	Medium	Assessment is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by giving production volumes for multiple years but uncertainty is not addressed.
Overall Quality Determination		Medium	

Study Citation:	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.
HERO ID:	1267867
Conditions of Use:	Use

EXTRACTION	
Parameter	Data
Process description:	"In the air atomization painting system the paint is conveyed from a paint reservoir by either siphon pick up created by the airflow, or in the case of heavy, viscous or high solids paints, the reservoir is pressurized and the paint flows to the spray gun. In either case, compressed air atomizes the paint at the nozzle to form droplets or mist, releases the droplet cloud from the gun and conveys it to the workpiece. The atomization can take place external to the gun in the zone between the horns of the nozzle tip or inside the gun itself. In low pressure-low volume application, the system utilizes a special air-atomizing gun with low pressure air jets impinging on a primary stream of paint to provide the atomization mechanism. The paint fluid stream exits separately from the gun and is introduced into a secondary tip zone. The solid elliptical-shaped paint stream is atomized externally by two small air jets. The high volume –low pressure system uses compressed air at 3–6 psig and air flows of approximately 20 cfm to atomize the paint. In electrostatic application, the system places a negative charge on the paint particle by passing the paint mist through a corona discharge field. The charged particles are then attracted to the grounded workpiece. The early systems for fixed nozzle work utilized an external high voltage grid between the spray gun and the workpiece. In powder paint applications, the parts to be painted undergo a rigorous preparation process which may involve as few as 6 or as many as 24 cleaning steps. The bulk powder is fluidized to provide a particle cloud. In early systems the parts were immersed and coated directly in the fluidized powder cloud but now the fluidized powder is usually applied with a gun dispenser. After the workpiece is coated it, passes through an oven operating at temperatures of 160 to 250°C where the powder melts to form a continuous film and hardening takes place."
Throughput:	A 6-in, wide brush may use 7 gal of paint/day, a 9-in. roller may use 14 gal/day, and air spray use varies from 10 to 70 gal/day.
Chemical concentration:	Water-based paints contain 26-86% water, 0-1.1% biocides, 0.7-5% surfactants, 0-54% pigments, 6-27% latex, 6-14% alkyds, 0-15% coalescing agents, 0-0.5% amines, 0-2.2% plasticizers, 0-0.6% driers, and 0-4% others.

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	Medium	Data are for the use of paints and coatings, but D4 isn't explicitly mentioned,
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed by compiling results from different studies. Uncertainty isn't addressed.

Overall Quality Determination	High
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Study Citation:	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.		
HERO ID:	1267867		
Conditions of Use:	Processing		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	More than three million metric tons of natural and synthetic rubber are used annually.		
Process description:	”In the compounding process, the natural or synthetic rubber is received at the workstation in bale form and is cut into weighable pieces with a guillotine cutter. The various rubber chemicals specified in the formula are then weighed out for a specific batch size. This operation involves opening bagged and barreled material and placing it in hoppers for weighing. An automatic weigh system delivers a given amount of carbon black directly to the mixer from either a remote silo, a rigid container located near the Banbury, or a flexible bulk container. The carbon black, preweighed rubber, and additives on the conveyor are then charged to the Banbury, the charge door closes, and the mass falls into the mixer chamber where it is homogenized to ensure uniform dispersion of all ingredients. After the mixing operation is completed, the Banbury mixer charge is discharged to a drop mill located directly under the Banbury mixer on a lower floor. The two roll drop mill has rolls of 2–3 ft in diameter which rotate in different directions at different speeds. When the drop mill processing is completed, the rubber is slit and sheeted off to a conveyor. The sheeted rubber stock is cut into slabs and the slabs are dipped in an antitack slurry. The antitack material is frequently based on a clay, soapstone, or talc and is designed to prevent sticking.”		
Number of sites:	Approximately 1,500 rubber plants in the U.S.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	Medium	Data are for rubber product manufacturing, but D4 isn’t explicitly mentioned.
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed by compiling results from different studies. Uncertainty isn’t addressed.
Overall Quality Determination		High	

Study Citation:	Co., S.H. (1986). Environmental risk assessment for octamethylcyclotetrasiloxane (OMCTS).			
HERO ID:	5889398			
Conditions of Use:	MFG // Silicone processors (intermediate) / plastics material and resin manufacturing			
EXTRACTION				
Parameter		Data		
Production, import, or use volume:		80% of PV is used for intermediate in silicone based polymer production (pg 6); 1984 PV estimated between 110-130 million lbs (pg 14)		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for MFG and PROC, in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	N/A	PV info
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	PV info
Overall Quality Determination			High	

Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.			
HERO ID:	5884316			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	The basic production process for the study materials (D4, D5, and D6) begins with the production of silicon metal by electrolytic reduction of silica (usually quartzite sand) with carbon (coke) in an electric arc furnace. The purified silicon metal is reacted with methyl chloride (CH3Cl) in a fluid-bed reactor in the presence of a copper catalyst to form a mixture of reactive monomers termed methylchlorosilanes, principally dimethyldichlorosilane (DMDC). The DMDC monomer is further reacted by hydrolysis and polycondensation to form an oligomeric mixture of siloxanes, including the study materials (pg 324). More details pg 344-345, 352-53			
Number of sites:	2 firms (pg 41)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for MFG, an in-scope occupational scenarios.	
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	N/A	PD info	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	PD info	
Overall Quality Determination		High		

Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.
HERO ID:	5884316
Conditions of Use:	Silicone processors (intermediate) / plastics material and resin manufacturing

EXTRACTION

Parameter	Data
Production, import, or use volume: Process description:	87% of total volatile methyl siloxanes (VMS; includes both linear and cyclic (e.g., D4) siloxanes) produced in 1993 used as site-limited intermediate (pg 244) "Polymerization: Cyclic molecules, such as D4, can be easily ""opened up"" in the presence of a base catalyst at approximately 140°C to form a mixture of linear ""siloxanols."" In the presence of a ""chain stopper"" such as hexamethyldisiloxane (L2), these linear siloxanes are transformed into fully methylated, linear siloxane polymers (e.g., PDMS). These general reactions are given by: ... The extent to which the polymerization reaction runs to completion (the percent cyclic consumption) is dependent upon the relative amount of chain stopper present. Consequently, the siloxane polymer that is produced contains some unreacted cyclic materials. Most of these incidental cyclics are removed via vacuum stripping, but residual levels are found in the finished siloxane polymer material at levels ranging up to 0.5% by weight. These cyclic materials may remain in the siloxane polymer in subsequent processes (albeit at reduced levels)—even high-temperature processes, such as compounding (see below). The siloxane polymers produced are used in various finishing operations and end-use applications as discussed in the next section. (pg 345-46) Compounding: Compounding processes are of two main types: high-temperature and low-temperature. High-temperature compounding (HTC) is typically carried out in a process vessel-referred to informally as a ""dough mixer""-at temperatures of approximately 250°C. A dough mixer is a highly specialized mixing vessel used to mechanically stir extremely viscous materials. Fillers are added to the polymer which results in a high-viscosity material. The mixing is done under closed conditions to avoid the potential for an explosion from the volatile materials (D4, D5, and D6) that are liberated from the polymer at high temperatures. Low-temperature compounding (LTC) is carried out at room temperature using an extruder and/or batch mixing vessel (e.g., to produce sealants), or using a ""two-roll mill""-a mechanical set of ""rolling pins"" that allows for high-viscosity materials and additives to be blended at room temperature. Other additives are simultaneously mixed in with the silicone rubber as it is rolled into thin sheets. These sheets are rolled up into ""logs"" and remilled until some desired consistency or degree of ""kneading"" has been achieved. As with HTC, post-LTC extrusion is sometimes necessary—depending upon the end-curing application. (pg 347)"
Number of sites:	10 firms (pg 41)
Chemical concentration:	0.5% by weight unreacted cyclics in produced polymers (pg 346)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for PROC, an in-scope occupational scenarios.
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5: Sample Size	N/A	PD info
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	PD info

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Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.		
HERO ID:	5884316		
Conditions of Use:	Silicone processors (intermediate) / plastics material and resin manufacturing		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.			
HERO ID:	5884316			
Conditions of Use:	Personal care product manufacturing (formulation)			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	”78% of AP/D production is just antiperspirant (pg 216) 20% of domestic silicone fluids market (includes both linear and cyclic siloxanes) is for PCPs, but this accounts for vast majority of cyclics (e.g., D4) use outside of processing (i.e., proc as a reactant) (pg 338)”			
Process description:	””””Unit operations/processes employed in the manufacture of AP/Ds include: raw material receipt and storage, wet and dry mixing (at room or elevated temperatures), homogenization, filling, cooling, solidification, crystallization, and packaging. The two basic operations include formulation, the blending of ingredients and filling/packing of stock keeping units (SKUs) with the blended product. Flowcharts for the production of solid, roll-on, and aerosol forms are included herein. Mixing sequence, time-temperature profiles, and myriad process details add complexity to an otherwise straightforward manufacturing process. In the main, these operations are carried out in a semi-batch closed system-at least for those operations/processes where cyclomethicones are used. Plants are automated and continuous high-speed production lines (particularly for filling and packing) are employed. Smaller plants and custom manufacturing plants may be more labor intensive and employ more open processes, such as using drum feed for compounding (mixing) operations rather than pumping from external cyclomethicone storage tanks. Finished product is shipped to distributors and retailers for ultimate sale.”” (pg 181) Per pg 251/302, hair care/skin care production industry operations are generally analogous. Detailed PD for solid stick AP/Ds starting pg 209; Detailed PD for aerosol AP/Ds starting pg 213; Detailed PD for HC/SC starting pg 302; Detailed PD for roll-on (liquid) AP/Ds starting pg 263 ”			
Throughput:	10 plants produced 62.5 MM lbs of antiperspirant in 1995 (pg 215)			
Number of sites:	””””There are more firms in the AP/D industry, 14 marketers and approximately 40 contract manufacturers (see Appendix 1), but eight firms (procter & Gamble, Gillette, Colgate-Palmolive, Helene Curtis (now part of Unilever), Carter-Wallace, Bristol Myers (now Chattem), Unilever, and Revlon accounted for 95% of retail sales of underarm products in 1993. The HC/SC industry contains a greater number of firms, but is still highly concentrated (see Appendix L).”” (pg 41)			
Chemical concentration:	Hair/skin care: 180 marketing firms, 140 toll manufacturing firms (pg 287)” ”60% total cyclics in antiperspirants, <1% for hand/body lotions (pg 65); 25% total cyclics in lipstick (pg 79); total cyclics % in skin care products in Table 9 (pg 80); 10% total cyclics in sunscreen (pg 80) Solid AP/Ds: Cyclomethicones, which may account for 40% to 60% of the formulation, are used as carriers and emollients in the product (pg 205) Roll-on (liquid) AP/Ds: 0-5% cyclomethicone emollients in emulsion roll-ons (Table J-7, pg 212); 50-70% cyclomethicone carriers in suspension roll-ons (Table J-8, pg 263); Aerosol: deodorant: 65-75% solvent carriers (e.g., cyclomethicone); AP: 5-20% inert carrier/emolient (e.g., cyclomethicone) Total cyclomethicones content in HC/SC products in Table L-10, pg 311”			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	Low	Data are for formulation of personal care products, an FDA use, which is similar to the in-scope occupational scenarios relating to processing into formulation.	
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	N/A	PD data	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
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Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.		
HERO ID:	5884316		
Conditions of Use:	Personal care product manufacturing (formulation)		
		EVALUATION	
Domain	Metric	Rating	
Domain 4: Variability and Uncertainty			
	Metric 7: Metadata Completeness	N/A	PD data
Overall Quality Determination		Medium	

Study Citation:	Dow Chemical, (1998). D4, D5, and D6 exposure in the manufacture and use of personal care products: An interim assessment, with cover letter dated 12/09/1998.			
HERO ID:	5884316			
Conditions of Use:	Personal care products (barbers and beauticians)			
EXTRACTION				
Parameter	Data			
Chemical concentration:	"60% total cyclics in antiperspirants, <1% for hand/body lotions (pg 65); 25% total cyclics in lipstick (pg 79); total cyclics % in skin care products in Table 9 (pg 80); 10% total cyclics in sunscreen (pg 80) Total cyclomethicones content in HC/SC products in Table L-10, pg 311"			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Uninformative	Data are for use of personal care products, which is not in-scope (FDA use)
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	N/A	PD info
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	PD data
Overall Quality Determination		Uninformative		

Study Citation:	Franzen, A., Landingham, Van, C., Greene, T., Plotzke, K., Gentry, R. (2016). A global human health risk assessment for Decamethylcyclopentasiloxane (D5). Regulatory Toxicology and Pharmacology 74:S25-S43.			
HERO ID:	3223678			
Conditions of Use:	Incorporation into a product, Commercial use			
EXTRACTION				
Parameter	Data			
Throughput:	Application rate for various hair-care products used by barbers/beauticians: 6g/use for shampoo, 13.77g/use for conditioners, 5.8g/use for hair spray, 4.7g/use for brilliantine and pomade, and 5.6g/use for spray shine			
Chemical concentration:	Percent D5 in various personal care products provided in table as well as in Supplementary information document as ranges reported from various sources			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Medium	Data are for occupational exposure scenarios for D5, which is similar to the in-scope occupational scenarios for D4.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (range and single central tendency values) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by different personal care products tested, but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	Gentry, R., Franzen, A., Landingham, Van, C., Greene, T., Plotzke, K. (2017). A global human health risk assessment for octamethylcyclotetrasiloxane (D4). Toxicology Letters 279(Suppl 1):23-41.			
HERO ID:	4167493			
Conditions of Use:	Incorporation into a product			
EXTRACTION				
Parameter	Data			
Throughput:	provides application rate by barbers/beauticians for various hair care products, including shampoos, conditioner, hair spray, pomade, spray shine, cuticle coat, brilliantine, and coloring sprays (see Table 1 on page 7 and Table 4 on page 8).			
Chemical concentration:	Provides concentrations for a variety of personal care products compiled from other studies including antiperspirant/deodorant, shampoo, conditioner, hair spray, various cosmetics, moisturizer, sunscreen, soothing vapor (pages 7 and 8)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for use and formulation of consumer products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (single value central tendency) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		High		

Study Citation:	Group,, K.C. (1999). Estimation of margins of exposure: a preliminary risk assessment of octamethylcyclotetrasiloxane (D4) based on reproductive toxicity studies in rats, w/cover letter dated 07/23/199.			
HERO ID:	5884333			
Conditions of Use:	Silicone processors (intermediate) / plastics material and resin manufacturing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	As previously discussed in Section 3.1. 1. I, the formulation for roll-on APs is approximately 60% cyclosiloxanes, if the base fluid is DC 344 Fluid, with DC 344 Fluid containing approximately 90% D4. Therefore, for roll-on APs (Scenario I), ECA (1997) assumed the fraction of D4 in the roll-on AP to which the worker is exposed was approximately 54%. For Scenario 2 (exposure to neat DCC 344 Fluid), the fraction of the silicone liquid that was D4 was assumed to be 90%. (pg 90)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Uninformative	Data are for Processing for deodorant, which is an FDA use.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	Low	characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The assessment does not address variability or uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	Group., K.C. (1999). Estimation of margins of exposure: a preliminary risk assessment of octamethylcyclotetrasiloxane (D4) based on reproductive toxicity studies in rats, w/cover letter dated 07/23/199.			
HERO ID:	5884333			
Conditions of Use:	Personal care product manufacturing (formulation)			
EXTRACTION				
Parameter	Data			
Chemical concentration:	”The fraction of the AP/D applied that is D4 consists of two factors, the fraction of the formulation that consists of cyclic siloxanes combined with the fraction of cyclic siloxanes that consists of D4. Solid APs are estimated to contain 40-60% cyclosiloxanes (i.e., a blend of D4, D5, and D6), with the average or base case of 50% assumed by ECA (1997). It was then assumed that DC 345 Fluid containing 6% D4, the typical choice for this product, was used to make the AP. Therefore, ECA (1997) assumed the percent of AP/D applied that is D4 for solid AP/Ds to be 3%. For roll-on APs, whose formulation is approximately 60% cyclosiloxanes (midpoint of 50-70%), the base fluid was assumed to be DC 344 Fluid. DC 344 Fluid consists of approximately 90% D4. Therefore, for roll-on APs, ECA (1997) assumed the percent of AP/D applied that was D4 to be 54%. The base fluid for aerosol AP/D was also assumed to be OC 344 Fluid. The percentage of aerosol AP formulations that are cyclosiloxanes ranged from 5% to 20%. ECA (1997) assumed a midpoint of 12.5% for the amount of the formulation that consists of cyclics, and of that, 90% was assumed to be D4. Thus, ECA assumed (1997) that 11.25% of the aerosol AP/D applied was D4. (pg 64); As with AP/Ds, the fraction of the HC/SC applied that is D4 consists of two factors: the fraction of the formulation that consists of cyclosiloxanes combined with the fraction of cyclosiloxanes that consists of D4. Information was available on the percentage of cyclosiloxanes in various HC/SC products (Table 3.1-12). The percentage of cyclosiloxanes (base case) ranged from 2% (hair rinse) to 60% (hair cuticle coat). This information was provided to ECA (1997) by industry experts and reviewed for accuracy by the members of the Technical Steering Committee. The majority of the products have cyclosiloxane concentrations that are less than those in AP/D formulations... two ADI calculations were conducted by: 1) assuming the base fluid was high in D4 (DC 344 Fluid or equivalent) and 2) assuming a base fluid high in D5 and low in D4 (DC 345 Fluid or equivalent). DC 344 base fluid contains approximately 90% D4, while DC 345 base fluid contains approximately 6% D4. This fraction of D4 in the formulation combined with the fraction of the formulation that consists of cyclosiloxanes resulted in the D4f used for each HC/SC product in this assessment (Table 3.1-12). (pg 77)”			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	Uninformative	Data are for formulation of personal care products, an FDA use.	
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	Low	characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	concentration data	
Overall Quality Determination		Uninformative		

Study Citation:	OECD, (2021). Emission scenario document on the use of vapour degreasers.			
HERO ID:	12392017			
Conditions of Use:	Use of Solvents			
EXTRACTION				
Parameter	Data			
Process description:	Section 2 provides descriptions of various types of degreasing operations, Section 2.4 identifies common activities that releases and exposures are expected to occur			
Number of sites:	Provides methodology to estimate number of sites based on chemical production volume, annual throughput			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS/ESD is based on U.S. data.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.
Overall Quality Determination			High	

Study Citation:	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.			
HERO ID:	3808976			
Conditions of Use:	Automotive Coating Application			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	54,633,000 total gallons automotive refinish coatings/yr 99,747 - 1,097,457 gallons coating/yr (depending on coating type)			
Process description:	Repair/replace automotive surface, initial wash (water/detergent and/or solvent), sanding (dry or wet), mixing of primer coatings, spray paint (multiple layers of primer), curing/drying each layer, sanding (dry or wet), solvent wipe-down, mixing of each coating (basecoat and clearcoat), spray paint (multiple layers of basecoat and clearcoat), curing/drying each layer			
Throughput:	0.25-12 gal coating/site-day, depending on number of jobs Also provides method for adjsuting the use rate based on the type of coating product used			
Number of sites:	32,296			
Chemical concentration:	15-25%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data	
	Metric 3: Applicability	Medium	Data is for multiple in-scope occupational scenarios; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	2011 ESD utilizing information from sources before that time	
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (min, max, mean) but discrete samples not provided and distribution not fully characterized.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple coating types.	
Overall Quality Determination		High		

Study Citation:	OECD, (2009). Emission scenario document on adhesive formulation.		
HERO ID:	3827299		
Conditions of Use:	Processing		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	15.8-4,990 million kg adhesive/yr		
Life cycle description:	Formulation of Adhesives		
Process description:	Unloading raw materials from containers into mixing vessel, mixing, packaging/on-site storage		
Throughput:	Provides methodology for estimating throughput based on the amount of adhesive produced, and the concentration of the chemical in the adhesive		
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the adhesive use rate, and the concentration of the chemical in the adhesive formulation		
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions and types of adhesives.
Overall Quality Determination		High	

General Engineering Assessment

Study Citation:	OECD, (2011). Emission scenario document on the use of metalworking fluids.
HERO ID:	3827418
Conditions of Use:	Use of Degreasing Solvents

EXTRACTION	
Parameter	Data
Process description:	Provides descriptions, definitions, and illustrations of major operations that are part of the overall metal working process. Release and exposure points are identified.
Throughput:	Provides methodology to estimate annual use rate based on batch parameters
Number of sites:	Provides methodology to estimate number of sites based on chemical production volume, annual throughput

		EVALUATION		
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness				
	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity				
	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty				
	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.

Overall Quality Determination	High
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Study Citation:	OECD, (2015). Emission scenario document on use of adhesives.			
HERO ID:	3833136			
Conditions of Use:	Adhesive Application			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	1,500 - 9,100,000 kg adhesive/site-yr			
Process description:	unloading, dilute and mix (optional), application (roll, spray, curtain, bead/syringe), drying/curing, product finishing			
Throughput:	Provides methodology for estimating throughput based on the amount of adhesives used, and the concentration of the chemical in the formulation			
Number of sites:	541-22,294			
Chemical concentration:	Provides conc. estimates based on chemical function and adhesive type, not chemical specific.			
Comments:	50-365 operating days/yr			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions, types of adhesives, and end use markets.	
Overall Quality Determination		High		

Study Citation:	OECD, (2011). Emission scenario document on radiation curable coating, inks and adhesives.			
HERO ID:	3840008			
Conditions of Use:	Paint and coating manufacture			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	0.7-69.84 million kg coating/ink/adhesive/yr			
Process description:	Preheating (optional), Unloading raw materials from containers into mixing kettle, mixing, filtering, packaging			
Throughput:	Provides methodology for estimating throughput based on the amount of product produced, and the concentration of the chemical in the formulation			
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the use rate, and the concentration of the chemical in the formulation			
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	2011 scenario document with data greater than 20 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions and types of UV curable products.	
Overall Quality Determination		High		

Study Citation:	OECD, (2004). Emission scenario document on additives in rubber industry.			
HERO ID:	4445826			
Conditions of Use:	Rubber Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Provides total synthetic rubber production and synthetic and natural rubber consumption in various EU (including UK) countries indicating EU accounts for 25% of world synthetic rubber production, and percentage used for various end-use products, and market share of various rubbers (pages 10 and 11 of 39)			
Process description:	Mastication and creation of mixtures, shaping, vulcanisation/curing (described in pages 15-17 of 39)			
Throughput:	Provides throughputs of various rubber products at a generic point source (Table 8 on page 24 of 39)			
Chemical concentration:	Provides conc. estimates based on additive function, not chemical specific (page 34 of 39 has the formulas for this)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Low	Assessment from 2004 but is based on data greater than 20 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various additive functions, end-use products, and types of rubber.	
Overall Quality Determination		Medium		

Study Citation:	OECD, (2011). Emission scenario document on the chemicals used in water-based washing operations at industrial and institutional laundries.		
HERO ID:	6387321		
Conditions of Use:	Use of laundry products (industrial and institutional)		
EXTRACTION			
Parameter	Data		
Life cycle description:	Provides descriptions of both industrial and institutional laundry facilities		
Process description:	pgs 19-21/133 provides process descriptions including flow diagrams of the most common types of laundry processes and subprocesses.		
Throughput:	Table 0-6 provides throughput of percentage of laundry products by facility type. Table 0-7 provides throughputs of types of formulations used at sites. Pgs. 40-41/133 provides method to calculate site throughputs.		
Number of sites:	Pg 41 provides method to calculate the number of sites based on PV		
Chemical concentration:	Table 0-3 provides defaults for product types and concentrations		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS/ESD is based on U.S. data.
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The ESD is more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.
Overall Quality Determination		High	

Study Citation:	OECD, (2009). Emission scenario document on transport and storage of chemicals.			
HERO ID:	6393282			
Conditions of Use:	Transportation and Storage			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	11 million tonnes shipped via rail tankers 30 million tonnes shipped via pipelines			
Process description:	On-site storage of chemicals, filling of containers, transport to distributors/downstream users/consumers, containers with residual chemical transported to recycling/cleaning or disposal site, empty/cleaned containers returned to distributor or production site			
Throughput:	Road tankers: 18-25 tonnes Rail tankers: 130,000 L IBCs: 400-2,000 L or 225-2,270 kg Steel Drums: 49-416 L Steel Pails: </= 45 L Plastic drums: 9.5-208 L Fibre drums: 4-450 L or up to 400 kg Bags/sacks: 25-1000 kg Carboys: 10-50 L Glass bottles </=2.5 L			
Number of sites:	Container cleaning sites in UK: 40 for road tankers; 8 for steel drums; 8 for plastics drums; 6 for fibre drums; 13 for IBCs; 7 for hazardous waste containers			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	2009 scenario document which includes data greater than 20 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple chemical forms, containers and storage system types.	
Overall Quality Determination		Medium		

Study Citation:	OECD, (2015). Emission scenario document (ESD) on industrial use of industrial cleaners.			
HERO ID:	6414932			
Conditions of Use:	Cleaning and Degreasing Solvents			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	1-12,961 tonne/yr (Japan)			
Process description:	Provides descriptions for a variety of cleaning methods including ultrasonic, jet washing, oscillate (rotate) washing, mechanical vibration stirring, bubble washing, reduced pressure (vacuum) washing, jet (spray, shower) washing, steam washing			
Chemical concentration:	Provides conc. estimates based on type of cleaner, not chemical specific.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple cleaner types
Overall Quality Determination		Medium		

Study Citation:	OECD, (2004). Emission scenario document on textile finishing industry.			
HERO ID:	6558533			
Conditions of Use:	Fabric, textile, and leather products not covered elsewhere			
EXTRACTION				
Parameter	Data			
Life cycle description:	Manufacture of Textiles, Apparel, and Leather			
Process description:	Finishing agents applied from aqueous solutions/dispersions by means of foulards (padding machines), drying, curing AND/OR Coating and laminating applied via blade, spraying, and printing techniques			
Throughput:	6-13 tonnes textile/day 20-1,000 kg finishing agent/tonne textile			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple finishing agent types
Overall Quality Determination		Medium		

Study Citation:	OECD, (2009). Emission scenario documents on pulp, paper and board industry.			
HERO ID:	6558581			
Conditions of Use:	Processing: Incorporation into formulation, mixture, or reaction product (Other or Processing aid/antifoaming agent)			
EXTRACTION				
Parameter	Data			
Life cycle description:	Pulp, Paper and Board Products			
Process description:	Paper-making: Stock preparation, wet end operation, pressing, drying, finishing, reel-up Recycling Fiber Processing: repulping, enzymatic dye-inking, high density cleaning, screening (perforated), screening (slotted), low consistency cleaning, flotation, thickening, washing, depurging/dispersion, dissolved air flotation, high density storage, bleaching			
Throughput:	0.003 - 0.9 processing aids (defoamers) kg /tonne paper (Table 3.2, pg 43/137)			
Chemical concentration:	Provides conc. estimates based on the chemical function and type of paper product, not chemical specific.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple chemical functions and paper products.	
Overall Quality Determination		Medium		

Study Citation:	SEHSC, (2020). Request for risk evaluation under the Toxic Substances Control Act; Octamethylcyclotetrasiloxane (D4; CASRN: 556-67-2).			
HERO ID:	7296376			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter		Data		
Production, import, or use volume:		2012: 500,000,000-750,000,000 lbs; 2013: 750,000,000-1,000,000,000 lbs; 2014: 750,000,000-1,000,000,000 lbs; 2015: 750,000,000-1,000,000,000 lbs		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from a frequently used source
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for all other manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by giving production volumes for multiple years but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	Tran, T. M., Hoang, A. Q., Le, S. T., Minh, T. B., Kannan, K. (2019). A review of contamination status, emission sources, and human exposure to volatile methyl siloxanes (VMSs) in indoor environments. Science of the Total Environment 691:584-594.		
HERO ID:	6836071		
Conditions of Use:	Personal care product manufacturing (formulation) / PCP Use		
EXTRACTION			
Parameter	Data		
Chemical concentration:	686 mg/g total cyclic VMSs in skin care products, 0.09-67.3 ug/g in body washes, shaving foams, shaving gels, and toothpastes (pg 2); more concentration data split up for D4-D6 in Table 1 (pg 3)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data/authors are from various countries, including the U.S., OECD countries such as Japan, and non-OECD countries such as China
	Metric 3: Applicability	Low	Data are for formulation/use of personal care products, an FDA use, which is similar to the the in-scope occupational scenarios relating to processing into formulation.
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent (i.e., data typically consolidated for multiple volatile methyl siloxanes, discrete D4 data not presented).
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by evaluating data for multiple product types within the COU but uncertainty is not addressed.
Overall Quality Determination		Medium	

Study Citation:	Tran, T. M., Tu, M. B., Vu, N. D. (2018). Cyclic siloxanes in indoor environments from hair salons in Hanoi, Vietnam: Emission sources, spatial distribution, and implications for human exposure. Chemosphere 212:330-336.			
HERO ID:	6833839			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Shampoos: 15.2 (ug/g); hair gels: 27.4 (ug/g); hair mousse: 5.87 (ug/g). (P. 4/7, Table 1)			
Comments:	Table 1-Concentrations of three cyclic siloxanes in hair care products, indoor dust, and indoor air samples.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from Vietnam, a non-OECD country.
	Metric 3:	Applicability	High	Data are for personal care products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by testing for concentrations in multiple products but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	U.S. EPA, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	10368811			
Conditions of Use:	Use of Cleaning Products			
EXTRACTION				
Parameter	Data			
Life cycle description:	Provides a very high level lifecycle description			
Process description:	Section 2 provides a process description including diagrams. Receive cleaning products at sire -> apply cleaning products -> soil extraction			
Throughput:	Section 3.5 and Table 3-2 provides throughput data based on products type			
Number of sites:	Section 3.8 provides methodology to calculate number of sites			
Chemical concentration:	Tables 1-1 and 1-2 provide concentration by additive type data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2022). Commercial use of automotive detailing products - Generic scenario for estimating occupational exposures and environmental releases (Methodology review draft).			
HERO ID:	10480464			
Conditions of Use:	Commercial Use - Automotive Care Products			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Provides methodology to estimate annual use rate based on number of cars, product used per car, and density of product			
Life cycle description:	Use - Automotive detailing products			
Process description:	Receive detailing products, dilute with water, application to vehicle through washing, polishing, and/or wiping			
Throughput:	260 batches/yr (i.e. 1 batch per day)1 to 16 ounces of automotive detailing product per car			
Number of sites:	Provides methodology to estimate number of sites based on chemical production volume, annual throughput - 147,152 total establishments			
Chemical concentration:	Provides conc. estimates based on the chemical function, not chemical specific.			
Physical form:	liquids, pastes, or clays/waxes			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS is based on U.S. data	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering different chemical functions	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2023). Use of laboratory chemicals - Generic scenario for estimating occupational exposures and environmental releases (Revised draft generic scenario).			
HERO ID:	10480466			
Conditions of Use:	Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Provides methodology to estimate annual use rate.			
Process description:	Receive chemicals, weigh or measure chemical, add chemical to labware, dilute/add other laboratory chemicals, add sample, run analytical testing, dispose of sample and laboratory chemical waste.			
Throughput:	255 grams reagent/site-day (average); 2,000 mL reagent/site-day (average); Table 3-2 gives daily throughput for laboratory stock solutions.			
Number of sites:	Provides methodology to estimate number of sites based on chemical production volume, annual throughput - 40,639 total establishments.			
Chemical concentration:	Provides conc. estimates based on the chemical function, not chemical specific.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS is based on U.S. data.	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering different chemical functions	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	11182966			
Conditions of Use:	Repackaging			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Table B-1 presents PMN data on repackaging rate in kg chemical/site-yr.			
Process description:	Pre-manufacture notices (PMN) submitted from 2010 to 2020 under EPA’s New Chemicals Program indicated imported and repackaged chemicals can be solids or liquids and may be neat or in solutions/mixtures and contained in various packaging types. After they arrive at the repackaging site, repackaging operations occur where the chemical is transferred from the transport container it was imported in to a new one of a different size in order to meet the customer’s needs (JACO, 2021). Chemicals may also be transferred from original containers to intermediate storage containers before packaging into smaller containers (Cooke, 2013; NIOSH, 2009). Chemicals are expected to be received at repackaging sites in drums or larger bulk containers (supersacks, totes, tank trucks, etc.) (Cooke, 2013; NIOSH, 2009). The chemical of interest may be received in its final formulation and transferred directly from these large containers into smaller containers, charged to a temporary storage tank, or it may be charged to a mixing tank and diluted or mixed with other chemicals before it is repackaged. Once the chemical has been formulated to desired specifications, it can be repackaged. Workers may be potentially exposed during the unloading of chemicals from the original transport containers into temporary storage or new transport containers. Releases of chemicals may also occur during this stage, from open container surfaces (e.g., if the chemical is volatile), transfer operations (e.g., if the chemical is volatile or a powder), and original transport container disposal. Repackaging operations for liquid chemicals typically involve pouring or pumping the product from the original containers or mixing /storage tanks into the new containers. A study conducted by the Health and Safety Laboratory in the U.K. investigated two chemical repackaging sites (Cooke, 2013). At both of these sites the chemical was delivered to the site by road tanker and pumped into dedicated storage tanks. One of the sites, a hydrazine supplier, pumped the hydrazine into a mixing vessel where it was diluted with water and packaged into smaller containers for sale to customers. At the other site, trichloroethylene was pumped from storage tanks into a closed loop system where workers using a hydraulic lance connected to a semi-automated filling system transferred the chemical into new containers (Cooke, 2013). The usual process for repackaging solid chemicals differs from the processes for liquids. A NIOSH Health Hazard Evaluation Report (HHE) from 2009 investigated a repackaging facility that was transferring bulk shipments of silane-coated glass beads ranging between 0.2 – 1.2mm in diameter. At this facility, 2,200 lb supersacks of the product are lifted with a forklift over a metal bin, then cutting the bottom of the container with a knife to empty the beads into the bin. The metal bin is then lifted by a forklift, and the glass beads are poured into hoppers. From the hoppers the beads are gravity fed into smaller cardboard boxes or paper sacks that are shipped to customers (NIOSH, 2009). Workers may be potentially exposed during the transfer of chemicals from temporary storage into new transport containers. Releases of chemicals may also occur during this stage from open container surfaces (e.g., if the chemical is volatile), transfer operations (e.g., if the chemical is volatile or a powder), and cleaning any equipment that was used in during the process.			
Number of sites:	Table 1-2 presents the number of repackaging sites based on 2019 U.S. Census data.			
Chemical concentration:	A fraction of completed IRERs from 2010-2020 were reviewed, 21 submissions contained information on chemical repackaging. In these submissions, chemicals were repackaged at concentrations ranging from 1% to 100%, with a 50th percentile of 93%, a 95th percentile of 100%, and a mode of 100%.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	Assessment is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
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Study Citation:		U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).		
HERO ID:		11182966		
Conditions of Use:		Repackaging		
Domain		Metric	EVALUATION	
			Rating	Comments
Metric 5:		Sample Size	High	Statistical distribution of samples is fully characterized (discrete use amounts provided).
Domain 3: Accessibility/ Clarity				
Metric 6:		Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty				
Metric 7:		Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple repackaging facilities.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2014). Formulation of waterborne coatings - Generic scenario for estimating occupational exposures and environmental releases -Draft.			
HERO ID:	3827197			
Conditions of Use:	Formulation of Paints and Coatings			
EXTRACTION				
Parameter	Data			
Process description:	Provides process description for high level blending operations. Includes illustrations and expected release and exposure points.			
Throughput:	Provides batch parameters that can be used to calculate throughputs			
Number of sites:	Provides methodology to estimate number of sites based on chemical production volume, annual throughput			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality information/data from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS is based on U.S. data	
	Metric 3: Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.			
HERO ID:	6549571			
Conditions of Use:	Rubber Converting			
EXTRACTION				
Parameter	Data			
Process description:	Provides descriptions for several common converting processes			
Throughput:	Provides methods to calculate throughput based on batch parameters and/or overall production volume			
Number of sites:	Provides methods to calculate number of sites based on production volumes and/or economical data (NAICS, SOC, etc.)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Low	The completed exposure or risk assessment is more than 20 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple facilities.
Overall Quality Determination			High	

Study Citation:	3M, (2018). Safety Data Sheet: 3M Flow Additive 892.			
HERO ID:	7291103			
Conditions of Use:	Printing Inks			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0-2%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (printing inks).
	Metric 4:	Temporal Representativeness	High	Source is from 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	3M, (2019). Safety Data Sheet: 3M Screen Printing UV Ink 9864 Transparent Green (BS).			
HERO ID:	7291202			
Conditions of Use:	Printing Inks			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1-1%			
Comments:	Specific Gravity Approximately 1.3			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	From an OECD country (Canada).
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (Printing inks)
	Metric 4:	Temporal Representativeness	High	Source is from 2020, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	3M, (2019). Safety data sheet: Scotchgard™ leather and vinyl protector, 38601.			
HERO ID:	7310925			
Conditions of Use:	Use of Auto Detailing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	< 0.5 Trade Secret *; Density - 1 g/ml			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Abe, K., Hamaguchi, M., Umemura, T., Umeda, M. (1998). Thermal aging of silicone oil aromatic polyamide insulation systems. IEEE Transactions on Dielectrics and Electrical Insulation 5(4):578-582.			
HERO ID:	6836215			
Conditions of Use:	Use of silicone oils			
EXTRACTION				
Parameter	Data			
Chemical concentration:	cyclic siloxane oligomer concentrations (D3, D4, and D5) in silicone oil range between 0.1 - 5% based on temperature and thermal aging time (Figure 4)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The report uses high quality data and/or techniques or sound methods that are from frequently used sources (journal articles) and are generally accepted by the scientific community, and associated information does not indicate flaws or quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S. (Japan)	
	Metric 3: Applicability	Medium	The data in the report is not D4-specific (silicon oils contain D4, D5, and D6).	
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old.	
	Metric 5: Sample Size	Low	Distribution of samples is characterized by a chart with no statistics	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		Medium		

Study Citation:	Alpine Specialty Chemicals Ltd., (2016). Safety data sheet: Alpine green choice laundry detergent.			
HERO ID:	7310936			
Conditions of Use:	Cleaning Formulations			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.2-0.5%			
Comments:	Relative Density: Approx. = 1 (Water = 1)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	From an OECD country (Canada)
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (cleaning formulations)
	Metric 4:	Temporal Representativeness	High	Source is from 2016, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	America,, TCI (2019). Safety data sheet: Octamethylcyclotetrasiloxane.			
HERO ID:	7311185			
Conditions of Use:	Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	>98.0%			
Comments:	Relative density: 0.96			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (lab chems)
	Metric 4:	Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Asphalt,, United (2019). Safety data sheet: AP-5400 high solids silicone roof coating.			
HERO ID:	7311186			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.10 - 1.0%			
Comments:	Specific Gravity 1.37			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (paints and coatings).
	Metric 4:	Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Blending,, B&B, LLC, (2017). Safety Data Sheet (SDS): Jade Ceramic Coating - Ice.			
HERO ID:	12381253			
Conditions of Use:	Use of Automotive Care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	50–<75% by weight			
Comments:	Density 0.97 g/ml at 25 °C			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Brooke, D. N., Crookes, M. J., Gray, D., Robertson, S. (2009). Environmental risk assessment report: Decamethylcyclopentasiloxane.			
HERO ID:	7330442			
Conditions of Use:	All- generic			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	intermediates for the production of polymeric siloxanes (Chandra, 1997). The remaining 13 per cent (around 20,000 tonnes) were used in personal care products (particularly the D4 and D5 cyclic products).			
Process description:	Very pure (>99.99 per cent) dimethyldichlorosilane starting material is needed if the linear fraction of siloxane oligomers is to be used directly in the manufacture of silicone polymers(Rich et al., 1997). The presence of methyltrichlorosilane impurity in the starting material can produce significant amounts of trifunctional units in the resulting oligomers, which then mayadversely affect the properties of the final polymeric products. If high-purity dimethyldichlorosilane is not used, an additional cracking step must be included in the overall production process. In the cracking step, the hydrolysate is depolymerised in the presence of strong bases or acids to give cyclic monomers, such as D4 and D5, which are removed by distillation.In summary, PDMS-based polymers appear to be able to break down to form D4, D5, and D6 under certain conditions			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S
	Metric 3:	Applicability	Medium	The report is for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, in terms of the type of industry, operations, and work activities.
	Metric 4:	Temporal Representativeness	Medium	more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	N/A	Process description
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Capela, D., Alves, A., Homem, V., Santos, L. (2016). From the shop to the drain - Volatile methylsiloxanes in cosmetics and personal care products.			
HERO ID:	Environment International 92-93(Elsevier):50-62.			
Conditions of Use:	5427151			
	Personal care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	[Mean] Adult body lotion: 22.98 (μg/g); hand creams: 4.83 (μg/g); facial creams: 13.8 (μg/g); roll-on deodorants: 2.87 (μg/g); adult shower gels: 25.67 (μg/g); adult shampoo: 91.45 (μg/g); adult hair conditioner: 34.03 (μg/g); solid soap: 0.71 (μg/g); gel soap: 1.17 (μg/g); adult toothpaste: 0.02 (μg/g); shaving foam/gel: <LOQ (μg/g); aftershave: 2.6 (μg/g)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Portugal, an OECD country.
	Metric 3:	Applicability	Uninformative	Data are for personal care products regulated by FDA.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed by comparing results to other studies. Variability addressed by sampling D4 concentrations in various personal care products.
Overall Quality Determination		Uninformative		

Study Citation:	Castaldo, (2020). Safety Data Sheet (SDS): Component for Polyurethane mold rubber (Quicksil Firm Part A).			
HERO ID:	11581709			
Conditions of Use:	Plastic and Rubber Products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1-1%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	From an OECD country (UK)
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (plastic and rubber products)
	Metric 4:	Temporal Representativeness	High	Source is from 2020, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Cazacu, M., Marcu, M., Dragan, S., Matricala, C. (1996). Anionic polymerization of cyclosiloxanes in heterogeneous medium. Journal of Applied Polymer Science 60(5):731-734.			
HERO ID:	5622705			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	hydrolysis of dimethyldichlorosilane, followed by distillation on a Vigreux column (pg 1)			
Chemical concentration:	99% (pg 1)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data are from Romania, a non-OECD country	
	Metric 3: Applicability	Medium	Data are for manufacturing, an in-scope occupational scenario; however, data is for lab-scale production.	
	Metric 4: Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	N/A	concentration data	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Low		

Study Citation:	CEPE, (2020). SpERC fact sheet: Industrial application of coatings by spraying.			
HERO ID:	10442901			
Conditions of Use:	Paint and Coatings			
EXTRACTION				
Parameter	Data			
Throughput:	'Table 5.1 Substance use rate' presents the 'Amount of substance use per day: numerical value' as the 'Typical maximum daily usage, for any one substance, based on sector knowledge 1000 kg product/day at any one location' for Substance function — Max daily substance use rate in kg/dPigment/extender/filler — 100.0 kg/d;Binder — 100.0 kg/d;Water — 350.0 kg/d;Organic solvent/coalescent — 450.0 kg/d;Additives — 5.0 kg/d;			
Comments:	Background information found at https://echa.europa.eu/documents/10162/8718351/cepe_sperc_background_document_application_of_coatings_aug18_updated_en.pdf/6265d9e2-902d-3bef-c17b-8c908f26eec6?t=1611056681505			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The source data or references are not described, but background information was found at https://echa.europa.eu/documents/10162/8718351/cepe_sperc_background_document_application_of_coatings_902d-3bef-c17b-8c908f26eec6?t=1611056681505
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Information was developed for use in REACH assessments which consists of OECD countries.
	Metric 3:	Applicability	Medium	The model was developed for 'Industrial application of coatings by spraying' and is applicable to occupational scenario within the scope of the risk evaluation, but information is not specific to D4 use.
	Metric 4:	Temporal Representativeness	High	The information was published within the last ten years.
	Metric 5:	Sample Size	Medium	Characterized by a maximum with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by providing different values based on chemical function, but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	CEPE, (2020). SpERC fact sheet: Professional application of coatings and inks by spraying.			
HERO ID:	10442902			
Conditions of Use:	Paints and coatings, Ink, toner, and colorant products			
EXTRACTION				
Parameter	Data			
Throughput:	Typical maximum daily usage, based on sector knowledge,100 kg product/day at any one locationPigment/extender/filler - 10 kg/dayBinder - 10 kg/dayOrganic solvent/coalescent - 45 kg/dayAdditives - 0.50 kg/day			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation but data is general and not specific to the chemical.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a maximum with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by including throughput for different substance functions but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	Chatterjee, J., Haik, Y., Chen, C. J. (2002). Synthesis of polyethylene magnetic nanoparticles. Journal of Dispersion Science and Technology 23(4):563-568.
HERO ID:	6836298
Conditions of Use:	Lab Use (as a solvent)

EXTRACTION	
Parameter	Data
Process description:	A very dilute (0.05% w=w) solution [D4 is solvent] (10 ml) of polyethylene wax and iron oxide mixture was made using decalin at 150C in a 25 ml screw cap scintillation vial by ultrasonication. The same amount of nonsolvent tetraglyme at the same temperature was added and sonicated at 50% amplitude for 30 seconds. After dissolution and mixing at 150C, the mixture was immediately cooled at 0C. An emulsion was formed within a few minutes. The solution was then maintained at room temperature. Within 45 min to one hour, polyethylene particles along with maghemite (g-Fe ₂ O ₃) were found to be suspended in the emulsion. The mixture was then kept at 10C in the refrigerator for about half an hour. A very thin reddish brown layer was observed at the junction of two liquids. The top and the bottom layer of liquids were extracted with the help of a micropipette and a syringe. The particles were then centrifuged in a microcentrifuge (because of the small quantity) to isolate them from the rest of the solvent mixture. The remaining solvent was removed and particles were washed with acetone. (pg 3)
Comments:	Article describes a lab scale process that appears to use D4 as a solvent for the production of polyethylene nanoparticles (unclear if this has applications for other COUs). Could be relevant to COUs that fall into the Incorporation into formulation, mixture, or reaction product if D4 is similarly used as a solvent during larger than lab scale operations.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for use in a Lab as a solvent, which is an occupational scenario within the scope of the risk evaluation. It is possible that this data could be relevant to other conditions of use as well.
	Metric 4:	Temporal Representativeness	Low	Report is based on data greater than 20 years old (2002)
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative of larger scale use.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.

Overall Quality Determination

Medium

Study Citation:	Claire, (2019). Safety data sheet: Plastic cleaner.			
HERO ID:	7310940			
Conditions of Use:	Cleaning Formulations			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.01 - <1%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (cleaning formulations)
	Metric 4:	Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Corning,, Dow (1977). Case history study on the operators in 602 building, Midland plant for exposure to octamethylcyclotetrasiloxane.			
HERO ID:	5885380			
Conditions of Use:	Silicone processors (intermediate) / plastics material and resin manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	polymerization of D4 into high molecular weight (Me2SiO)x gum which is used for the production of silicone rubber (pg 5 of 15)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for PROC, an in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	N/A	qualitative information.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	qualitative information.
Overall Quality Determination			High	

Study Citation:	Corning,, Dow (1986). Letter from Dow Corning Corp to EPA regarding production volume of OMCTS as presented in the test rule with attachment.			
HERO ID:	5900583			
Conditions of Use:	MFG // Silicone processors (intermediate) / plastics material and resin manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	”1983: 123 million lbs of SI metal sales -> 71.5-89 million lbs of OMCTS after conversion (pg 3) 1985: 148.6 million lbs of SI metal sales -> 86-108 million lbs of OMCTS after conversion (pg 3) Internal Dow Estimates: 80-100 million lbs in 1983, 110-135 million lbs in 1985; 80% consumed as intermediate (pg 3) estimated production in 1985: 86-108 million lbs (pg 2)”			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for MFG and PROC, in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	N/A	PV info
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	PV info
Overall Quality Determination			High	

Study Citation:	Corning,, Dow (1986). Dow Corning's OMCTS production rate and sales for 1981-1985 with cover letter (sanitized).
HERO ID:	5900585
Conditions of Use:	MFG // Silicone processors (intermediate) / plastics material and resin manufacturing / PCP formulation

EXTRACTION	
Parameter	Data
Production, import, or use volume:	"EPA states the 'Annual production of OMCTS has risen in the last decade from 1 million to over 100 million pounds per year, and the production is expected to increase'." (pg 3) ""Dow Corning will be producing 20 to 25 million lbs of octamethylcyclotetrasiloxane in 1982.' This estimate is based on only 6 months of production data... The same letter also stated 'approximately 80% of the total production of octamethylcyclotetrasiloxane is used internally as an intermediate in closed processes'. That estimate was also based on production volumes for the first 6 months of 1982.'" (pg 3) ""In 1982, only one-half of the manufactured volume of OMCTS that was designated for products to be formulated with OMCTS for sale and distribution in commerce was actually sold.'" (pg 5) for 1981-1985, % of OMCTS distributed in commerce ranged 6.3-11.5%, 7.7% total for the whole period. Table at bottom of pg 6 indicates that these % correspond to PCP formulations (pg 6)
Chemical concentration:	>1% in PCP formulations (pg 6)

		EVALUATION	
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for MFG and PROC, in-scope occupational scenarios.
	Metric 4: Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5: Sample Size	N/A	PV and concentration info
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	PV and concentration info

Overall Quality Determination	High
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Study Citation:	CPC, (2018). Safety data sheet: 209 Terand penetrant lubricant demoisturant protectant.			
HERO ID:	7310941			
Conditions of Use:	Use of Solvents			
EXTRACTION				
Parameter	Data			
Chemical concentration:	2.5 - 10%			
Comments:	Specific gravity 0.877 estimated			
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:		CRC Industries Inc., (2018). Safety Data Sheet (SDS): RTV Silicone Adhesive & Sealant - Black (pressurized).			
HERO ID:		11581720			
Conditions of Use:		Adhesives and Sealants			
Parameter		EXTRACTION			
Chemical concentration:		1-3%			
Comments:		Relative density 1.03			
Domain		Metric		EVALUATION	
				Rating	Comments
Domain 1: Reliability		Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness		Metric 2:	Geographic Scope	High	Product is from a US supplier.
		Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (adhesives and sealants).
		Metric 4:	Temporal Representativeness	High	Source is from 2018, which is less than 10 years old.
		Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity		Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty		Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination		High			

Study Citation:	Dow Chemical, (2018). Safety Data Sheet (SDS): DOWSIL 734 Flowable Sealant, Clear.			
HERO ID:	11581710			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	>= 0.27 - <= 0.2982 %			
Comments:	Relative Density (water = 1) 1.03			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (adhesives and sealants)
	Metric 4:	Temporal Representativeness	High	Source is from 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Dow Chemical, (2023). Safety data sheet: DOWSIL™ 3140 RTV coating.			
HERO ID:	7310944			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	>= 0.05 - <= 0.21 %			
Comments:	Has potential applications as a Potting Agents and/or Conformal CoatingRelative Density (water = 1) 1.05			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (Potting Agents and Conformal Coatings).
	Metric 4:	Temporal Representativeness	High	Source is from 2023, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Dudzina, T., Goetz, von, N., Bogdal, C., Biesterbos, H., J.W., Hungerbühler, K. (2014). Concentrations of cyclic volatile methylsiloxanes in European cosmetics and personal care products: Prerequisite for human and environmental exposure assessment. Environment International 62:86-94.			
HERO ID:	6833831			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Deodorants/antiperspirants: 0.053 (mg/g); cosmetics: <0.00071 (mg/g); skin care: <0.00071 (mg/g); hair care: 0.0055 (mg/g); sun care: 0.0085 (mg/g)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Switzerland, an OECD country.
	Metric 3:	Applicability	Low	Data are for personal care products and may be applicable to an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by testing for concentrations in multiple products but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	EC/HC, (2008). Screening assessment for the challenge: Octamethylcyclotetrasiloxane (D4): CASRN 556-67-2.			
HERO ID:	6993847			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In Canada, no companies manufactured more than 100 kg of D4, but between 1,000,000 and 10,000,000 kg were imported in 2006. According to information from the US EPA, the import/production of D4 in the United States was in the range of 22,500–45,000 tonnes in all reporting years from 1986 to 2002.			
Chemical concentration:	D4 is imported into Canada with purity over 99%.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality techniques from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from Canada, an OECD country.	
	Metric 3: Applicability	High	Data are for the import of D4, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed by comparing data between Canada and the United States. Uncertainty isn't addressed.	
Overall Quality Determination		High		

Study Citation:	ECHA, (2020). REACH registration dossier: Octamethylcyclotetrasiloxane.			
HERO ID:	6993064			
Conditions of Use:	Unknown (provides a "tonnage band" for EU)			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	"Tonnage band" for EU 100,000-1,000,000 tonnes/year (pg 1)			
Comments:	Provides a list of European Registrants/Suppliers on pg. 7-9/10			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources (ECHA REACH dossier).
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are for various OECD countries (ECHA).
	Metric 3:	Applicability	Low	It is unclear if the D4 is just being used or actually produced by the listed entities.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Low	

Study Citation:	Ecolab, (2019). Safety data sheet: Low Temp Laundry Clearly Soft.			
HERO ID:	7310954			
Conditions of Use:	Laundry Formulations			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 - 1%			
Comments:	Relative density : 0.98 - 1.04			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (cleaning formulation)
	Metric 4:	Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Ecolink, (2015). Safety data sheet: NAVSOLVE.			
HERO ID:	7310958			
Conditions of Use:	Aircraft Maintenance			
EXTRACTION				
Parameter	Data			
Chemical concentration:	25-50%			
Comments:	Relative Density (water = 1) 1.05			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (aircraft maintenance)
	Metric 4:	Temporal Representativeness	High	Source is from 2015, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Elkem, (1997). Technical Data Sheet for CYCLICS BLEND 0586.			
HERO ID:	6992425			
Conditions of Use:	Manufacturing/Formulation			
EXTRACTION				
Parameter	Data			
Process description:	Packaging: drums of 25kg, drum of 200kg, pallet of 950kg			
Chemical concentration:	Cycliques 0586 contains 79% D4.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data/techniques/methods not from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for processing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability is not applicable as its data specific to company product and uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	EPRO, (2020). Safety Data Sheet (SDS): SILICONE MAGIC C-5, SILICONE MAGIC.			
HERO ID:	11581724			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	.06 - 1.9%			
Comments:	Specific Gravity (H2O = 1): 1.0			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (Paints and coatings)
	Metric 4:	Temporal Representativeness	High	Source is from 2020, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.			
HERO ID:	7349020			
Conditions of Use:	Processing as a Reactant (Plastic Material and resin manufacturing)			
EXTRACTION				
Parameter	Data			
Process description:	”Solid and foamed plastic products are manufactured by a variety of methods. The choice of manufacturing techniques used to process a plastic product depends largely on whether the resin is a thermoplastic or thermoset, and the dimensions, shape, or physical qualities of the desired product.This section describes the major manufacturing techniques used to fabricate intermediate and final plastic products. Extrusion is the most widely used processing technique, followed by injection molding, blow molding, and foam processing (Midwest Research Institute, 1993).These four manufacturing techniques, in addition to lamination, coating, and finishing operations, are described below” p. 11			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data that are from frequently used sources and are generally accepted by the scientific community, and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation, however it is not chemical specific
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old. The report captures operations, equipment, and worker activities that are expected to be outdated.
	Metric 5:	Sample Size	N/A	This data is not dependent on sampling
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium		

Study Citation:	ERM, (2012). D4 and d5 conceptual site models and mass balance report.			
HERO ID:	6998155			
Conditions of Use:	Processing- Polymerization			
EXTRACTION				
Parameter	Data			
Life cycle description:	Products of polymerization of D4 are high performance silicone oils and gums, silicone elastomer intermediates, and polymers used in the production of solvents, diluents, cosmetics and perfumes.			
Process description:	Raw materials pumped into continuous or batch reaction vessels and purification. Generally closed systems.			
Throughput:	Operation times range between 304-8,760 hr/year			
Number of sites:	surveyed 9 sites (see Table 1 for site identities, pg. 35)			
Chemical concentration:	Various products such as silicone oils and gums produced through polymerization of 99% D4 or mixed formulation.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	The assessment or report uses high quality data that are not from a frequently used source and associated information does not indicate flaws or quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for processing, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	N/A	Qualitative information	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Some variability is addressed by surveying 9 processing sites but uncertainty is not addressed.	
Overall Quality Determination		High		

Study Citation:	ERM, (2012). D4 and d5 conceptual site models and mass balance report.		
HERO ID:	6998155		
Conditions of Use:	Manufacturing		
EXTRACTION			
Parameter	Data		
Process description:	precursor processes-> reaction->separations-> storage tanks-> loading operations (pg. 15); For precursor processes, the product is dichlorodimethylsilane, which is then hydrolyzed with aqueous hydrochloric acid in continuous closed reactors to produce siloxanes. Further processing removes residual acid and chloride and recover hydrochloric acid for reuse in the precursor processes.Separation processes recover the different chain length distributions at different stages and may include phase separation, flash distillation or fractionation distillation. Different products are stored separately until they are packaged for sale to off-site customers or for on-site processing.(pg. 15-16)		
Number of sites:	surveyed 2 sites (see Table 1 for site identities, pg. 35)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	The assessment or report uses high quality data that are not from a frequently used source and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for manufacturing, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	N/A	Qualitative information
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Some variability is addressed by surveying 2 manufacturing sites but uncertainty is not addressed.
Overall Quality Determination		High	

Study Citation:	ERM, (2012). D4 and d5 conceptual site models and mass balance report.			
HERO ID:	6998155			
Conditions of Use:	Processing- Formulation			
EXTRACTION				
Parameter	Data			
Process description:	D4 products are stored as raw materials, then mechanically pumped to mixing equipment, where they are mixed with other materials to produce products used by industrial facilities or consumers. Can occur continuously or in batch, typically closed reactors. Lastly, desired product packaged in bulk or small containers. (pdf pg. 16-17)			
Number of sites:	surveyed 7 formulation sites (see Table 1 for site identities, pg. 35)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	The assessment or report uses high quality data that are not from a frequently used source and associated information does not indicate flaws or quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for processing into a formulation, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	N/A	Qualitative information	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Some variability is addressed by surveying 7 formulation sites and uncertainty is not applicable for only process description.	
Overall Quality Determination		High		

Study Citation:	Farasani, A., Darbre, P. D. (2017). Exposure to cyclic volatile methylsiloxanes (cVMS) causes anchorage-independent growth and reduction of BRCA1 in non-transformed human breast epithelial cells. Journal of Applied Toxicology 37(4):454-461.			
HERO ID:	6833997			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Life cycle description:	Cyclic volatile methylsiloxanes (cVMS) are used as solvents andconditioning/spreading agents in a wide range of personal careproducts (PCP; Johnson et al., 2011; Dudzina et al., 2014).Octamethylcyclotetrasiloxane (D4) and decamethylcyclopentasiloxane(D5) are commonly used as a blended mixture termedcyclomethicone which may also include hexamethylcyclotrisiloxane(D3) as an impurity and the longer chain dodecamethylcyclohexasiloxane(D6) (Johnson et al., 2011).			
Chemical concentration:	D4 purity purchased from Sigma-Aldrich: 98%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the United Kingdom, an OECD country.
	Metric 3:	Applicability	High	Data are for manufacture, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	N/A	Life cycle description.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium		

Study Citation:	Faultless, (2019). Safety data sheet: Niagara Fabric Finish Spray Sizing.			
HERO ID:	7311091			
Conditions of Use:	Fabric Finishing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	< 0.1%			
Comments:	Specific Gravity : 1.0 g/ml			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (cleaning formulations)
	Metric 4:	Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Franzen, A., Greene, T., Landingham, Van, C., Gentry, R. (2018). Corrigendum to ”Toxicology of octamethylcyclotetrasiloxane (D4)” [Toxicol. Lett., 279, October (Suppl. 1), 2-22]. Toxicology Letters 290:62.			
HERO ID:	6833984			
Conditions of Use:	Health studies			
EXTRACTION				
Parameter	Data			
Chemical concentration:	61 - 36,089 ug/L			
Comments:	This document is a correction to HERO ID 6834006.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Uninformative	Data are for health testing for inhalation exposure experiments which is not in-scope or similar to an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Uninformative		

Study Citation:	GmbH., O.E. (2022). Safety Data Sheet (SDS): ORALITE 5019i blue (050).			
HERO ID:	11581717			
Conditions of Use:	Printing Inks			
EXTRACTION				
Parameter	Data			
Chemical concentration:	<0.1%			
Comments:	Density: 1,09 g/cm³			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	From an OECD country (Germany)
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (printing inks)
	Metric 4:	Temporal Representativeness	High	Source is from 2022, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Gunzbourg, De, A., Maisonnier, S., Favier, J. C., Maitre, C., Masure, M., Hémary, P. (1998). Ionic polymerization in aqueous emulsion. Macromolecular Symposia 132:359-370.
HERO ID:	6836209
Conditions of Use:	Plastics Material and Resin Manufacturing

EXTRACTION	
Parameter	Data
Process description:	The monomer was added to a solution of emulsifying agent in water and the mixture was homogeneized using a sonifier 450 Branson Ultrasonics Corporation (power 7 during 6 min). During emulsification, the mixture was cooled with an ice bath in order to keep the temperature constant (- 5°C). The emulsion was transferred in a four-necked reactor and nitrogen was bubbled through the solution for five minutes and the reaction temperature was adjusted with a thermoregulated oil bath. The polymerization was carried out under a slight nitrogen flow and under mechanical stirring (100 rpm). Aliquots were taken during the course of the polymerization and neutralized to a pH near 8 in order to stop the reaction. (pg 2-3). Also discussed is the polymerization reaction scheme/kinetics with the addition of an initiator, after pg 3
Chemical concentration:	Octamethylcyclotetrasiloxane, tetramethylcyclotetrasiloxane and phenoxymethyloxirane (phenylglycidylether) were used without further purification. Chromatographic analysis indicated that less than 1 wt.-% other cyclic or linear materials are present (pg 2) Also provides monomer/solvent/initiator/etc. ratios throughout article.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from France, an OECD country.
	Metric 3:	Applicability	Medium	Data are for plastics material and resin MFG, an in-scope occupational scenario; however, presented PD data is for laboratory scale polymerization.
	Metric 4:	Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	N/A	PD info
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	PD info

Overall Quality Determination	Medium
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Study Citation:	Guo, J., Zhou, Y., Cui, J., Zhang, B., Zhang, J. (2019). Assessment of volatile methylsiloxanes in environmental matrices and human plasma. Science of the Total Environment 668:1175-1182.			
HERO ID:	6836347			
Conditions of Use:	Laboratory chemical			
EXTRACTION				
Parameter	Data			
Chemical concentration:	D4 as a standard for cVMSs: >98% (pg. 3)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	High	Data are for laboratory chemicals, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution is characterized by a minimum with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Guo, J., Zhou, Y., Cui, J., Zhang, B., Zhang, J. (2019). Assessment of volatile methylsiloxanes in environmental matrices and human plasma. Science of the Total Environment 668:1175-1182.		
HERO ID:	6836347		
Conditions of Use:	Paints and Coatings		
EXTRACTION			
Parameter	Data		
Throughput:	Production/usage volume of additives/products per day (kg/year): construction, 5.8-7.2, automobile factory, 420, and paint factory, 1900-2200 (Table S16, pg. 20)		
Chemical concentration:	Paint used in Construction: 7.1-31 ug/g; Paint used in automobile factory: 218-380 ug/g; Paint in Paint factory: 11-52 ug/g (Table S12, pg. 17)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources (e.g.,article) and are generally accepted by the scientific community, and associatedinformation does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	The data are from a non-OECD country, China, and locality-specific factors (e.g., potentially greaterdifferences in regulatory occupational exposure or emission limits, industry/ processtechnologies) may impact exposures or releases relative to the U.S., or the country of origin isnot specified.
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5: Sample Size	High	Discrete samples provided
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, andassumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report addresses variability by surveying different occupational sites, and uncertainty discussion was limited.
Overall Quality Determination		High	

Study Citation:	Guo, L., Jiang, S., Qiu, T., Zhang, S., He, L., Tan, J., Li, X. (2014). Miniemulsion polymerization of fluorinated siloxane-acrylate latex and the application as waterborne textile finishing agent. Journal of Applied Polymer Science 131(8):40162.			
HERO ID:	6835652			
Conditions of Use:	Lab Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	D4 purchased from Sage Chemical Co. Ltd. in China was 99% pure.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality [data/techniques/methods] from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data are from China, a non-OECD country.	
	Metric 3: Applicability	High	Data are for Lab Use, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.	
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Medium		

Study Citation:	Guo, L., Jiang, S., Qiu, T., Zhang, S., He, L., Tan, J., Li, X. (2014). Miniemulsion polymerization of fluorinated siloxane-acrylate latex and the application as waterborne textile finishing agent. Journal of Applied Polymer Science 131(8):40162.			
HERO ID:	6835652			
Conditions of Use:	Processing as a reactant (latex based fabric finishing agent)			
EXTRACTION				
Parameter	Data			
Process description:	Fluorinated siloxane–acrylate polymer latex was synthesized via miniemulsion polymerization, which was carried out bypseudo one-step method. In the synthesis protocol, the monomers of octamethylclotetrasiloxane (D4), tetravinyltetramethylcyclotetrasiloxane (D4v), methyl methylacrylate, butyl acrylate, N-methylol acrylamide, and dodecafluoroheptyl methacrylate (DFMA) were first mixed and homogenized into a miniemulsion, which was stabilized by dedecylbenzene sulfonic acid. The ring-opening polymerization of cyclosiloxane was then steadily performed under miniemulsion conditions and followed by the postaddition of radical initiators to initiate the polymerization of acrylate and DFMA monomers...The further application of theas-synthesized latex was investigated as a new			
Comments:	This was only done on a lab scale, unclear about real world uses of this			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	Medium	Data are similar to Processing as a Reactant, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium		

Study Citation:	Helm, J. S., Nishioka, M., Brody, J. G., Rudel, R. A., Dodson, R. E. (2018). Measurement of endocrine disrupting and asthma-associated chemicals in hair products used by Black women. Environmental Research 165:448-458.			
HERO ID:	4728485			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	[median] Anti-frizz/polish hair products: 1,282 (μg/g); root simulator: 8 (μg/g); Hair Relaxer: 24 (μg/g); Only one sample of each: Leave-in conditioner: >100-1,000 (μg/g); Hot oil treatment: 1-100 (μg/g)			
Comments:	A related, response article was also identified (6834503) which provides the values for each sample and is evaluated separately.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Uninformative	Data are for hair care products, which is outside the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Variability addressed by testing D4 concentrations in multiple products and uncertainty is addressed in limitations section.
Overall Quality Determination		Uninformative		

Study Citation:	Helm, J. S., Nishioka, M., Brody, J. G., Rudel, R. A., Dodson, R. E. (2019). Re: Measurement of endocrine disrupting and asthma-associated chemicals in hair products used by Black women. Environmental Research 172:719-721.			
HERO ID:	6834503			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Hot oil treatment: 16 (ug/g); Anti-frizz/polish: 478-2591 (ug/g); leav-in conditioner: 462 (ug/g); root stimulator: 4-52 (ug/g); hair lotion: <1-4 (ug/g); hair relaxer: 4-24 (ug/g)			
Comments:	Same experiment and results as reported in initial article (4728485) but each sample value is reported in this response article.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Uninformative	Data are for personal care products regulated by FDA, which is outside of the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by sampling multiple hair care products but uncertainty is not addressed.
Overall Quality Determination		Uninformative		

Study Citation:	Henkel, (2018). Safety Data Sheet (SDS): LOCTITE SI 5399 RD known as 5399 RED 100ML DK FI NO SE.			
HERO ID:	11581712			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	<3%			
Comments:	Density 1.050 g/cm3			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	From an OECD country (Germany).
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (adhesives and sealants).
	Metric 4:	Temporal Representativeness	High	Source is from 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Henry, (2016). Safety Data Sheet (SDS): Pro-Grade® 988 Silicone White Roof Coating.			
HERO ID:	11581719			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1-5%			
Comments:	Relative density 1.2 - 1.3			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (paints and coatings).
	Metric 4:	Temporal Representativeness	High	Source is from 2016, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Johnson, W., Bergfeld, W. F., Belsito, D. V., Hill, R. A., Klaassen, C. D., Liebler, D. C., Marks, J. G., Shank, R. C., Slaga, T. J., Snyder, P. W., Andersen, F. A. (2011). Safety assessment of cyclomethicone, cyclotetrasiloxane, cyclopentasiloxane, cyclohexasiloxane, and cycloheptasiloxane. International Journal of Toxicology 30(Suppl. 3):149S-227S.
HERO ID:	6835206
Conditions of Use:	Use of personal care products

EXTRACTION	
Parameter	Data
Chemical concentration:	present at approximately 90% in Dow Corning Fluids 244 and 344; impurities in D4 include D5 and D6... deodorants and anti-perspirants may contain up to 60%... percentage use in various products listed out in table (primarily cosmetics and personal care products)
Comments:	Table 1. Properties of Cyclomethicone Dow Corning Fluids (SEHSC, 2009) ³

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for use of personal care products, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by range of concentrations for personal care products, but uncertainty is not addressed.

Overall Quality Determination	High
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Study Citation:	Kirk-Othmer, (2008). Silicones.			
HERO ID:	7317302			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Process description:	Direct Process. Passing methyl chloride vapors through a bed of copper and silicon at temperatures near 3008C yields a mixture of methylchlorosilanes. The efficiency of this process is critically dependent on reactor design and chemistry. Optimization of the fluidized bed reactor is a critical part of the industrial process (22). The rate of MCS production and selectivity for dichlorodimethylsilane are significantly affected by trace elements in the catalyst bed; very pure copper and silicon give poor rate and selectivity (23–25).Polymerization.The manufacture of polydimethylsiloxane polymers is a multistep process. The hydrolysis of the chlorosilanes obtained from the direct process yields a mixture of cyclic and linear silanol-stopped oligomers, referred to as hydrolysate (Fig. 15). In some cases, chloro-stopped polymers can also be obtained (102).			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Kirk-Othmer Encyclopedia of Chemical Technology
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, in terms of the type of industry, operations, and work activities. Not Specific to D4.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	Process description
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Kong, X. Z., Zou, D., Zhu, X. (2014). Influence of main ingredients on properties of latex and latex film in polysiloxane modification of styrene-butyl acrylate copolymers. Journal of Polymer Research 21(3):396.			
HERO ID:	3769448			
Conditions of Use:	Rubber product manufacturing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	8% by weight in latex.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	High	Data are for rubber product manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Lee, M., Kim, J. H., Lee, D., Kim, J., Lim, H., Seo, J., Park, Y. K. (2018). Health risk assessment on hazardous ingredients in household deodorizing products. International Journal of Environmental Research and Public Health 15(4):744.		
HERO ID:	4730751		
Conditions of Use:	Deodorizing agents		
EXTRACTION			
Parameter	Data		
Throughput:	Amount used per application(50th percentile): 0.54 g/s for fabrics trigger product, 0.60 g/s for indoor air trigger product, 0.99 g/s for air-conditioner trigger product, liquid diffuser 0.11 g/hr (Table 4, pg. 6)		
Chemical concentration:	11.412-218.314 mg/kg (Table 7, pg. 8)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The report uses high quality data and/or techniques or sound methods that are from frequently used sources (journalarticles,) and are generally accepted by the scientific community, and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data is from South Korea, an OECD country.
	Metric 3: Applicability	Low	The report is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, use of air care products.
	Metric 4: Temporal Representativeness	High	Less than 10 years old (2018)
	Metric 5: Sample Size	Medium	Distribution is characterized by different percentiles(5th, 50th, 75th, 95th), median range and S.D. but full data set not provided.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, andassumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The report addresses variability and uncertainty in the results
Overall Quality Determination		High	

Study Citation:	Lightning,, White (2020). Safety data sheet: WHITE LIGHTNING® SILICONE RUBBER window & door sealant clear.			
HERO ID:	7311199			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.5%			
Comments:	Relative density 1.06			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (adhesives and sealants).
	Metric 4:	Temporal Representativeness	High	Source is from 2023, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Lin, M., Chu, F., Bourgeat-Lami, E., Guyot, A. (2005). Particle size in emmulsion polymerization of octamethyltetrasiloxane. Journal of Dispersion Science and Technology 25(6):827-835.			
HERO ID:	6835694			
Conditions of Use:	Processing as a reactant			
EXTRACTION				
Parameter	Data			
Process description:	Emulsions of SDBS, DBSA, deionized water, and D4 were prepared. The emulsion was purged with nitrogen and brought to polymerization temperature.; Emulsions of octamethylcyclsiloxane (D4) and of its mixtures with tetramethyltetravinylcyclsiloxane (D4v), stabilized with SDBS as surfactant, display Ostwald ripening			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data are from China, a non-OECD country.	
	Metric 3: Applicability	High	Data are for processing as a reactant, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.	
	Metric 5: Sample Size	N/A	Not applicable - process description	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Not applicable - process description	
Overall Quality Determination		High		

Study Citation:	Liu, N., Xu, L., Cai, Y. (2017). Methyl siloxanes in barbershops and residence indoor dust and the implication for human exposures. Science of the Total Environment 618:1324-1330.			
HERO ID:	4168341			
Conditions of Use:	Use in personal care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	highest concentrations observed in several personal care products; 72.9 micrograms/gram			
Comments:	Information cited from 6301725.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data that are in peer-reviewed journal and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	Low	Data are for occupational scenario (barbers) but products specified likely fall under FDA, which is outside the scope of the risk evaluation. The information may be useful for personal care products within the scope.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old (2018).
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report clearly documents results and data sources but methods and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by numerous personal care products tested, but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	Lu, Y., Yuan, T., Wenhua, W., Kannan, K. (2011). Concentrations and assessment of exposure to siloxanes and synthetic musks in personal care products from China. Environmental Pollution 159(12):3522-3528.			
HERO ID:	6301725			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Toothpastes: <LOQ; hair care products: 13.8 (ug/g); body washes: 0.05 (ug/g); toilet soaps: 1.11 (ug/g); skin lotions: 3.53 (ug/g); makeup: 6.83 (ug/g). Table 2 (P. 3/7)			
Comments:	Table 1Limit of quantification (LOQ, ng g-1) for cyclic and linear siloxanes and syntheticmusks in personal care products purchased from China.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	High	Data are for personal care products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Report is based on current industry conditions and data no more than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The report addresses variability and uncertainty in the results
Overall Quality Determination			Medium	

Study Citation:	Luu, Do, H. M., Hutter, J. C. (2001). Bioavailability of octamethylcyclotetrasiloxane (D-4) after exposure to silicones by inhalation and implantation. Environmental Health Perspectives 109(11):1095-1101.			
HERO ID:	81361			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	It is present at 40–60% by weight in personal care products such as antiperspirants, cosmetics, and hair care products.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for concentrations in personal care products. Formulation of these types of products is an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Madi, H., Diethelm, S., Poitel, S., Ludwig, C., Herle, Van, J. (2015). Damage of siloxanes on Ni-YSZ anode supported SOFC operated on hydrogen and bio-syngas. Fuel Cells 15(5):718-727.		
HERO ID:	6835747		
Conditions of Use:	Disposal		
EXTRACTION			
Parameter	Data		
Process description:	In the present study we report degradation and post-exposure behavior of SOFC anodes upon addition of an organic silicon compound (siloxane D4) to the main fuel stream. First, experiments were performed with H2 fuel at 800 oC for duration of 100 h. The main objective was to evaluate the impact of D4 on the SOFC performance, when operated on H2 fuel, and the possibility of performance recovery. Then a more complex fuel, representative of biogas reformat, was used, and tested on cells at 750 oC, at 0.25 A cm−2 current density for 250 h operation. Voltage-current (V–I) characterization was performed before and after each level of impurity concentration, and EIS measurements taken periodically. D4 was injected in different concentrations up to 5 ppm and a regeneration step allowed between each concentration change.		
Chemical concentration:	825 PPM of D4 in anaerobic digester gas (ADG) from WWTP. Total VMSs in biogas: 2-30 mg / Nm3 and 4-80 mg / Nm3 according to site and season variability (pg 2)		
Comments:	Fig. 1 Average concentration (ppm) of siloxanes measured in anaerobic digester gas (ADG) from WWTP		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from Switzerland, an OECD country.
	Metric 3: Applicability	High	Data are for disposal, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	N/A	Process description.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by factoring different seasons/sites, but uncertainty is not addressed.
Overall Quality Determination		High	

Study Citation:	Meeks, R. G. (2002). Bioavailability of D4 after inhalation and implantation exposure to silicones. Environmental Health Perspectives 110(8):A442-A443.
HERO ID:	6836217
Conditions of Use:	Personal care products MFG / Plastic and rubber products not covered elsewhere

EXTRACTION

Parameter	Data
Chemical concentration:	"The level of low molecular weight siloxanes (LMWS), both cyclic and linear, that persist in the polydimethylsiloxane (PDMS) used to make the silicone gel and elastomer shell of a breast implant is in the range of $\leq 0.1\%$. In a recent comprehensive pharmacokinetic study on PDMS, Jovanovic (4) measured the actual concentration of D4 to be 0.03% of the PDMS by weight. Our own analysis of D4 in silicone gel breast implants shows that D4 levels rarely exceed 700–1,000 ppm (0.07–0.1%). (pg 1) The estimate of daily intake reported by Shipp et al. (8) for D4 exposure from a variety of sources including personal care products is influenced by two characteristics or assumptions. First, at the time we completed our initial exposure assessment, roll-on antiperspirants (AP) contained up to 60% D4 and accounted for about 50% (70 $\mu\text{g/kg/day}$) of the estimated daily intake. In the last few years, there has been a shift away from D4 in rollon APs such that the estimate of daily intake today should be about 40–50% lower than the original value (pg 2)"

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	Uninformative	Data are for formulation of personal care products/silicone breast implant MFG, an FDA use.
	Metric 4: Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Low	characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination**Uninformative**

Study Citation:	Ministers,, N.C. (2006). Siloxanes in the Nordic Environment.			
HERO ID:	7002238			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Total D4 use in the Nordic countries (Denmark, Faroe Islands, Finland, Iceland, Norway, Sweden) was 5 tons in 1999, 55 tons in 2000, 77 tons in 2001, 119 tons in 2002, and 60 tons in 2003.			
Comments:	Figure 1. Registered use of D4 (left) and D5 (right) in the Nordic countries (SPIN, 2005).			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality techniques from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the Nordic countries, all of which are OECD countries.
	Metric 3:	Applicability	High	Data are for many commercial and consumer uses like personal care products, automotive care products, and adhesives and sealants, all of which are in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range (presented as a graph) with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed by mentioning confidential use volumes from certain countries. Variability isn't addressed.
Overall Quality Determination			High	

Study Citation:	Mohorič, I., Ebenik, U. Å. (2011). Semibatch anionic ring-opening polymerization of octamethylcyclotetrasiloxane in emulsion. Polymer 52(20):4423-4428.			
HERO ID:	6833931			
Conditions of Use:	Processing as a reactant			
EXTRACTION				
Parameter	Data			
Process description:	Semibatch experiments: Ionic (5.63 g) and nonionic (0.63 g) emulsifier were dissolved in deionized water (300 g) in the reactor. The emulsifier solution was stirred at 500 rpm and heated up to 80 C. Then, the initiator (1.00 g) was added. Afterward, the monomer (50 g) was fed to the reactor with constant flow rates (0.10, 0.15, 0.25 and 0.40 ml/min). The volumetric flow rates corresponded to mass flow rates 0.096, 0.144, 0.240 and 0.384 g/min, respectively. The reactor content was sampled during the polymerization at scheduled times. To stop the polymerization, pH value of the withdrawn samples and emulsion at the end of the process was adjusted to 8 using HCl (0.5 M). The semibatch experiments and samples obtained by them are labeled as PDMS/ SB/X, where X stands for monomer feed rate in ml/min. Batch experiment: The monomer pre-emulsion was prepared at room temperature by dissolution of ionic and nonionic emulsifiers in deionized water in the reactor. Monomer (50 g) was added to the emulsifier solution and the pre-emulsion was stirred at 1000 rpm for 15 min. After 15 min, the mixture was heated up to 80 C. The stirring rate was lowered to 500 rpm. To initiate the polymerization KOH was added. During polymerization, the reactor content was sampled at scheduled times. HCl was used to stop the polymerization. The batch experiment and samples obtained by it are labeled as PDMS/B. (P. 2/6)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from Slovenia, an OECD country.	
	Metric 3: Applicability	High	Data are for processing as a reactant in an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	N/A	Not applicable - process description	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		High		

Study Citation:	Momentive, (2019). Safety Data Sheet (SDS): OPTIC 3101 CLEAR 5GP.			
HERO ID:	11581716			
Conditions of Use:	Paints and coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 - <1%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (paints and coatings)
	Metric 4:	Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Momentive, (2012). Safety Data Sheet (SDS): RTV103 ACETOXY SEALANT (black).			
HERO ID:	11581721			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1 - 5 %			
Comments:	DENSITY: ca. 1.06 g/cm3			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (adhesives and sealants)
	Metric 4:	Temporal Representativeness	Medium	More than 10 but less than 20 years old (2012)
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Momentive, (2020). Safety Data Sheet (SDS): Momentive Emulsion SM 2112 NPF.			
HERO ID:	12391848			
Conditions of Use:	Residual Uses			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1 - <3% by weight			
Comments:	Density: 0.995 g/cm3			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Momentive, (2022). Safety Data Sheet (SDS): 92506 QBB.			
HERO ID:	12391973			
Conditions of Use:	Rubber Compounding and Converting			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 - <1%			
Comments:	Density: ca. 1.160 g/cm3			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Product is from a US supplier.	
	Metric 3: Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (enter COU/OES).	
	Metric 4: Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	Momentive, (2023). Safety Data Sheet (SDS): Momentive TUFEL 94605.			
HERO ID:	12391981			
Conditions of Use:	Rubber Compounding and Converting			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 - <1%			
Comments:	Density: ca. 1,170 g/cm3			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Momentive, (2023). Safety Data Sheet (SDS): Momentive TUFEL 94406.			
HERO ID:	12391983			
Conditions of Use:	Rubber Compounding and Converting			
EXTRACTION				
Parameter	Data			
Chemical concentration:	3 - <5%			
Comments:	Density: ca. 1,070 g/cm3			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Momentive, (2022). Safety Data Sheet (SDS): Momentive TUFEL 94506.			
HERO ID:	12391984			
Conditions of Use:	Rubber Compounding and Converting			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 - <1%			
Comments:	Density: 1.14 g/cm3			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Momentive, (2018). Safety data sheet: Silshield 3100 neutral base 5GP.			
HERO ID:	7311118			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 - <1%			
Comments:	Density: ca. 1.207 g/cm3Relative density: ca. 1.30			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (paints and coatings)
	Metric 4:	Temporal Representativeness	High	Source is from 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	NCBI, (2021). PubChem database: compound summary: Octamethylcyclotetrasiloxane.			
HERO ID:	6982832			
Conditions of Use:	MFG			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	750,000,000 - 1,000,000,000 lb (pg 20); >100 million-500 million lbs (pg 21)			
Process description:	PDF pg 19-20 - Use descriptions; MFG: isolated from hydrolysis product of dimethyldichlorosilane, Acid hydrolysis of dimethyldichlorosilane gives a hydrolysate mixture of linear and cyclic polysiloxanes with D4 as the main cyclic component			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are for various OECD countries (PubChem citing U.S. and EU countries).	
	Metric 3: Applicability	High	Data are for MFG, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	N/A	PV and PD info	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent (PubChem).	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	PV and PD info	
Overall Quality Determination		High		

Study Citation:	NCBI, (2021). PubChem database: compound summary: Octamethylcyclotetrasiloxane.			
HERO ID:	6982832			
Conditions of Use:	Various			
EXTRACTION				
Parameter	Data			
Process description:	Pg 19-22: various use descriptions			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are for various OECD countries (PubChem citing U.S. and EU countries).	
	Metric 3: Applicability	High	Data are for various in-scope occupational scenarios.	
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	N/A	PD info	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent (PubChem).	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	PD info	
Overall Quality Determination		High		

Study Citation:	NCBI, (2021). PubChem database: compound summary: Octamethylcyclotetrasiloxane.			
HERO ID:	6982832			
Conditions of Use:	Incorporation in formulation, mixture, or reaction product			
EXTRACTION				
Parameter	Data			
Process description:	The combination of D4 /octamethylcyclotetrasiloxane/ with decamethylcyclopentasiloxane (D5) is commonly referred to as cyclomethicone which has a wide range of applications as a formulation aid in personal care products. (pg 20)			
Chemical concentration:				
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are for various OECD countries (PubChem citing U.S. and EU countries).
	Metric 3:	Applicability	High	Data are for PROC, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	N/A	concentration info
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent (PubChem).
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	concentration info
Overall Quality Determination			High	

Study Citation:	NICNAS, (2020). Cyclic volatile methyl siloxanes: Environment tier II assessment.			
HERO ID:	6996262			
Conditions of Use:	Manufacture (Import)			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In the USA, more than 138,000 tons of D4 were imported or manufactured in 2012.			
Life cycle description:	It was estimated that the cumulative volume of D4, D5 and D6 used in the US personal care market in 2009 was more than 31,000 tons.			
Comments:	"In addition to high-volume uses as industrial intermediates, chemicals in this group have multiple applications in cosmetics and personal care products (HSDB, 2018). They are solvents that function as volatile carriers of the active ingredients used in a range of spray-on and roll-on personal care products, including antiperspirants, deodorants and hair spray. In these applications, the cyclic volatile methyl siloxane carrier readily evaporates from the skin surface leaving the active ingredients behind (Andriot, et al., 2008)."			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality techniques from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Australia, an OECD country.
	Metric 3:	Applicability	High	Data are for personal care products, automotive care products, and adhesives and sealants, all of which are in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by compiling results from different studies. Uncertainty isn't addressed.
Overall Quality Determination			High	

Study Citation:	Novion,, Inc., (2020). Safety Data Sheet (SDS): DryWay Water-Repellent Concrete Sealer.			
HERO ID:	11581711			
Conditions of Use:	Paints and coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1-1%			
Comments:	SPECIFIC GRAVITY 1.01			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (paints and coatings)
	Metric 4:	Temporal Representativeness	High	Source is from 2020, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Nuco, (2017). Safety Data Sheet (SDS): Nuflex 302 - General Purpose Silicone Sealant - High Temperature - Red.			
HERO ID:	11581713			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.05-0.15%			
Comments:	Relative Density (water = 1) 1.007 at 25 °C (77 °F)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	From an OECD country (Canada)
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (adhesives and sealants)
	Metric 4:	Temporal Representativeness	High	Source is from 2017, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Nuco, (2011). Safety Data Sheet (SDS): Nuflex 366 Marine Silicone Sealant.			
HERO ID:	11581714			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 – 1.0%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	From an OECD country (Canada).
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (adhesives and sealants).
	Metric 4:	Temporal Representativeness	Medium	More than 10 but less than 20 years old (2011).
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Palmer Asphalt Company, (2021). Safety Data Sheet (SDS): #203 High Solids Bulldog Silicone Coating.			
HERO ID:	11581708			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1 – 5%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (paints and coatings)
	Metric 4:	Temporal Representativeness	High	Source is from 2021, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Polishes,, Adam’s (2017). Safety data sheet: Adam’s buttery wax.			
HERO ID:	7310926			
Conditions of Use:	Use of Automotive Care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1–5%; Density - 0.98–1.02 g/cm³			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Product is from a UK supplier.	
	Metric 3: Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation	
	Metric 4: Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		Medium		

Study Citation:	Polymer,, Advanced (2016). Safety data sheet: APS-232HCA.			
HERO ID:	7310927			
Conditions of Use:	Formulation of D4 products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	50%			
Comments:	Specific Gravity (77°F): ~1.00			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Qayouh, H., Lahcini, M., Six, J. L., Kricheldorf, H. R. (2012). Polymerizations of hexamethylcyclsiloxane catalyzed by metal sulfonate/acid chloride combinations. Journal of Applied Polymer Science 124(5):4114-4120.			
HERO ID:	6835608			
Conditions of Use:	Processing as a reactant			
EXTRACTION				
Parameter	Data			
Process description:	99% conversion of D4 was only observed after 48 h, whereas (samarium triflate + dichlorodiphenylsilane) yielded a complete polymerization of D3 after only 1 h (Table IV).			
Comments:	This could be applicable to several different subcategories of Processing as a reactant, this reaction(s) described here appear to be related to using D4 as a monomer for further use(s)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The assessment or report uses high quality data and/or techniques or sound methods that are not from a frequently used source and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from Morocco, a non-OECD country.
	Metric 3:	Applicability	High	Data are for processing as a reactant, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	N/A	Not applicable - process description
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Not applicable - process description
Overall Quality Determination		Medium		

Study Citation:	Raman, V., Gillis, D., Wolter, R. (2000). Flyability failures due to organic siloxanes at the head/disk interface. Journal of Tribology 122(2):444-449.			
HERO ID:	6836234			
Conditions of Use:	Adhesives and Sealant chemicals			
EXTRACTION				
Parameter	Data			
Process description:	One source of undesirable contamination from an interface reliability standpoint is silicones, the principal focus of this study. A common source of this chemical is the release liners in adhesives. The use of pressure sensitive adhesives in assembly operations, as gaskets, as protective seals against the environment in drives and in perimeter sealing of hard disk drive clamshells are commonplace in the drive industry (pg 1)			
Comments:	This specifically applies to the "release liner" of pressure sensitive adhesives			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Report is over 20 years old
	Metric 5:	Sample Size	N/A	N/A data is descriptive of types of uses
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium		

Study Citation:	Raman, V., Gillis, D., Wolter, R. (2000). Flyability failures due to organic siloxanes at the head/disk interface. Journal of Tribology 122(2):444-449.			
HERO ID:	6836234			
Conditions of Use:	Computer and electronic product manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	Provides two methods/products that are used to lubricated computer disks, they appear to be "Fomblin Z-dol" and "X-1P" "The deleterious effects of siloxane outgassing that lead to changes in theflying characteristics of the slider and subsequent interface failure are described for disks lubricated with Fomblin Z-dol. Chemical identification of the accumulated material on the slider following flyability testing is described. Strikingly different performance is observed for disks lubricated with the cyclic phosphazene X-1P which shows significantly improved flyability performance."(pg 1)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evalu-ated.	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Low	Report is over 20 years old	
	Metric 5: Sample Size	N/A	N/A data is descriptive of types of uses	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		Medium		

Study Citation:	Rogers Corporation, (2018). Safety Data Sheet (SDS): DSP HS-30 Blue.			
HERO ID:	12391976			
Conditions of Use:	Rubber Compounding and Converting			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1 - 5% by weight			
Comments:	Density: 1.0-2.0 (rubber only)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Product is from a US supplier.	
	Metric 3: Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (enter COU/OES).	
	Metric 4: Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	Roofspec,, Viking (2023). Safety Data Sheet (SDS): Seamless Seal Ultra HSLV.			
HERO ID:	11581722			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1 - 5%			
Comments:	DENSITY: ca. 1.3 g/cm3			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	From an OECD country (New Zealand)
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (paints and coatings)
	Metric 4:	Temporal Representativeness	High	Source is from 2023, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Rust-Oleum, (2018). Safety data sheet: Pro 1-GL 2pk gloss leather brown 100VOC.			
HERO ID:	7311149			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	10-25%			
Comments:	Relative Density: 1.117			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (paints and coatings).
	Metric 4:	Temporal Representativeness	High	Source is from 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Safety-Kleen, (2016). Safety data sheet: QSOL™ 220 cleaning solvent.			
HERO ID:	7311151			
Conditions of Use:	Aircraft Maintenance			
EXTRACTION				
Parameter	Data			
Chemical concentration:	3-7%			
Comments:	Specific Gravity (water=1) 1.3 (Approximate Water = 1)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (aircraft maintenance).
	Metric 4:	Temporal Representativeness	High	Source is from 2016, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	SCCP, (2005). Opinion on Octamethylcyclotetrasiloxane (D4) cyclomethicone (INCI name).			
HERO ID:	6989916			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter	Data			
Life cycle description:	The functions of octamethyltetracyclosiloxane in cosmetics are reported as antistatic / emollient / humectant / solvent / viscosity controlling / hair conditioning. In addition, silicone containing formulations have a good spreadability.			
Chemical concentration:	Depending on the product type, the concentration of D4 in formulations varies between 0.1- and 54%. It is common to use a blend of cyclosiloxanes D4, D5 and D6 in cosmetic products. Thus, products containing D4 may also contain D5 and D6.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from European Union countries, which are OECD countries.
	Metric 3:	Applicability	Uninformative	Data are for personal care products, which is not an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Uninformative	

Study Citation:	SCCP, (2005). Opinion on Octamethylcyclotetrasiloxane (D4) cyclomethicone (INCI name).			
HERO ID:	6989916			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Neat D4: >95% - 99.8%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from European Union countries, which are OECD countries.
	Metric 3:	Applicability	Medium	Data are for neat concentration of the chemical which is similar to the concentration of the chemical during manufacture.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	SCCS, (2010). Opinion on cyclomethicone Octamethylcyclotetrasiloxane (Cyclotetrasiloxane, D4) and Decamethylcyclopentasiloxane (Cyclopentasiloxane, D5).		
HERO ID:	6989663		
Conditions of Use:	Personal care products		
EXTRACTION			
Parameter	Data		
Life cycle description:	The functions of octamethyltetracyclosiloxane in cosmetics are reported as antistatic / emollient / humectant / solvent / viscosity controlling / hair conditioning. In addition, silicone containing formulations have a good spreadability.		
Chemical concentration:	Depending on the product type, the concentration of D4 in formulations varies between 0.1- and 54%. It is common to use a blend of cyclosiloxanes D4, D5 and D6 in cosmetic products. Thus, products containing D4 may also contain D5 and D6.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3: Applicability	Uninformative	Personal care products are not in scope for the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Uninformative	

Study Citation:	SCCS, (2010). Opinion on cyclomethicone Octamethylcyclotetrasiloxane (Cyclotetrasiloxane, D4) and Decamethylcyclopentasiloxane (Cyclopentasiloxane, D5).			
HERO ID:	6989663			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Chemical concentration:	>95% - 99.8%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from European Union countries, which are OECD countries.
	Metric 3:	Applicability	Medium	The concentration is from Octamethylcyclotetrasiloxane used in tests, which may be similar to the concentration of the chemical during manufacturing.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Schultz Laboratories, (2014). Safety Data Sheet (SDS): White Diamond Black Pearl - Vehicle polish.			
HERO ID:	12391929			
Conditions of Use:	Use of Automotive Care Products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1 - 5% by weight			
Comments:	relative density - 1			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Product is from a EU supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Sealants,, Tremco (2018). Safety Data Sheet (SDS): SPECTREM 2 WHITE.			
HERO ID:	11581726			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 - 1%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (adhesives and sealants)
	Metric 4:	Temporal Representativeness	High	Source is from 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Shields, H. C., Fleischer, D. M., Weschler, C. J. (1996). Comparisons among VOCs measured in three types of US commercial buildings with different occupant densities. Indoor Air 6(1):2-17.			
HERO ID:	3449521			
Conditions of Use:	Personal care products			
EXTRACTION				
Parameter		Data		
Chemical concentration:		Some deodorants contain 40-60% D4.		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality [data/techniques/methods] that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for concentrations in personal care products. Formulation of these types of products is an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Shore Corporation, (2015). Safety data sheet: SB2445 oil repellent penetrating sealer.			
HERO ID:	7311157			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	5-10%			
Comments:	Specific Gravity: 0.87			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (paints and coatings).
	Metric 4:	Temporal Representativeness	High	Source is from 2015, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Sigma-Aldrich, (2023). Safety Data Sheet (SDS): Octamethylcyclotetrasiloxane.			
HERO ID:	11581715			
Conditions of Use:	Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	<= 100 %			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (lab chems)
	Metric 4:	Temporal Representativeness	High	Source is from 2022, which is less than 10 years old.
	Metric 5:	Sample Size	Low	<= 100%, could be any concentration. No further distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:		Sigma-Aldrich, (2018). Safety data sheet: D4 cyclomethicone.		
HERO ID:		7311162		
Conditions of Use:		Laboratory Chemicals		
Parameter		EXTRACTION		
Chemical concentration:		<= 100 %		
Domain		Metric		EVALUATION
				Rating
				Comments
Domain 1: Reliability		Metric 1:	Methodology	High
		SDS information is primary data from the supplier. SDS does not appear to have quality issues.		
Domain 2: Representativeness		Metric 2:	Geographic Scope	High
		Product is from a US supplier.		
		Metric 3:	Applicability	High
		SDS is applicable to an occupational scenario within the scope of the risk evaluation (lab chems).		
		Metric 4:	Temporal Representativeness	High
		Source is from 2023, which is less than 10 years old.		
		Metric 5:	Sample Size	Medium
		Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.		
Domain 3: Accessibility/ Clarity		Metric 6:	Metadata Completeness	Low
		Source just provides concentration and does not document how this value was obtained.		
Domain 4: Variability and Uncertainty		Metric 7:	Metadata Completeness	Medium
		Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.		
Overall Quality Determination		High		

Study Citation:	Silco Inc, (2015). Safety Data Sheet (SDS): SIL-BOND RTV 45000.			
HERO ID:	11581723			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	<1%			
Comments:	relative density 1.04			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (adhesives and sealants).
	Metric 4:	Temporal Representativeness	High	Source is from 2015, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Siltech, (2018). Safety data sheet: Silamine PD.			
HERO ID:	7311181			
Conditions of Use:	Fabric Finishing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	less than 0.5% by weight			
Comments:	Relative density / Specific Gravity (25oC) 1.03			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Product is from a Canadian supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the re- sults. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Solutions,, H.B. (2020). Safety Data Sheet (SDS): Thermo-Sil HS 3200 Series High Solids Silicone Roof Coating.			
HERO ID:	11581727			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter		Data		
Chemical concentration:		5 – 15%		
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (paints and coatings).
	Metric 4:	Temporal Representativeness	High	Source is from 2020, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Spartan, (2019). Safety data sheet: Shine Plus.			
HERO ID:	7311182			
Conditions of Use:	Cleaning Formulations			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1-1%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Product is from a US supplier.	
	Metric 3: Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (Cleaning formulations)	
	Metric 4: Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.	
	Metric 5: Sample Size	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	SpecChem, (2018). Safety Data Sheet (SDS): SpecSilane 20 WB.			
HERO ID:	11581725			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	>= 0.1 - < 1%			
Comments:	Relative Density: 1.01			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (paints and coatings)
	Metric 4:	Temporal Representativeness	High	Source is from 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Spectrum Chemical Mfg Corp, (2017). Safety Data Sheet (SDS): A1303 Antifoam AF.			
HERO ID:	12391914			
Conditions of Use:	Residual Uses			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1.3-1.4% by weight			
Comments:	Specific gravity: 1.0			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation (enter COU/OES).
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Thomasin, C., Johansen, P., Alder, R., Bemsel, R., Hottinger, G., Altorfer, H., Wright, A. D., Wehrli, G., Merkle, H. P., Gander, B. (1996). A contribution to overcoming the problem of residual solvents in biodegradable microspheres prepared by coacervation. European Journal of Pharmaceutics and Biopharmaceutics 42(1):16-24.
HERO ID:	6836182
Conditions of Use:	Laboratory Chemical

EXTRACTION	
Parameter	Data
Process description:	experimental preparation of biodegradable microspheres for use in drug delivery, which is a non-TSCA use at industrial scale.
Chemical concentration:	>99% in starting material (pg 2); 0.5-5% as residual hardening agent (Table 3; pg 5)

EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness				
	Metric 2:	Geographic Scope	Medium	Data are from Switzerland, an OECD country.
	Metric 3:	Applicability	High	Data are for lab chemical, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity				
	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty				
	Metric 7:	Metadata Completeness	Medium	Variability addressed by factoring different starting materials and drying conditions, but uncertainty is not addressed.

Overall Quality Determination	Medium
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Study Citation:	Toxicology Excellence for Risk Assessment (TERA) (2016). Exposure assessment: Potential for the presence of phthalates in specified materials at concentrations above 0.1 percent.
HERO ID:	5155525
Conditions of Use:	Processing

EXTRACTION	
Parameter	Data
Process description:	"Silicone rubbers may be produced using the monomers, dichloromethylsilane, D3 or D4. The production of the rubber starts with the hydrolysis or methanolysis of the chlorosilane monomers into oligomers (linear and/or cyclic). The hydrolysis of the chlorosilanes can be carried out in a batch or continuous process. A typical industrial production involves mixing dichloromethylsilane with aqueous hydrochloric acid in a continuous reactor. An alternative to the hydrolysis process is the methanolysis process. This process involves a one-step synthesis of organosiloxane oligomers and methyl chloride without formation of hydrochloric acid. Linear silanol-stopped oligomers are formed using the continuous methanolysis. Polycondensation results in the further conversion of the linear fraction of hydrolysate to silicone fluids and high molecular weight gums. The catalysts employed in the polycondensation reaction are strong acids, strong bases, amines, amine salts of carboxylic acids, ion exchange resins, and clays activated with mineral acids. An alternative to the polycondensation method of production of siloxane polymers is the ring opening polymerization of cyclic oligoorganosiloxanes. A chain stopper (unspecified) is added to control the molecular weight of the polymer; the amount of chain stopper added can vary the molecular weight from very low to very high. The cyclic siloxanes can also undergo anionic or cationic polymerization or be formed by polycondensation or ring-opening polymerization in aqueous emulsions "

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality techniques from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for synthetic rubber manufacturing, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	N/A	This metric is not applicable to the data being extracted
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	This metric is not applicable to the data being extracted

Overall Quality Determination	High
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Study Citation:	Tran, T. M., Abualnaja, K. O., Asimakopoulos, A. G., Covaci, A., Gevao, B., Johnson-Restrepo, B., Kumosani, T. A., Malarvannan, G., Minh, T. B., Moon, H. B., Nakata, H., Sinha, R. K., Kannan, K. (2015). A survey of cyclic and linear siloxanes in indoor dust and their implications for human exposures in twelve countries. Environment International 78:39-44.			
HERO ID:	3013038			
Conditions of Use:	Manufacturing, Use of products			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	total worldwide production of siloxanes in 2002 was 2 million tons, with 34% used in North America			
Chemical concentration:	8.2% concentration of cyclic siloxanes in personal care and household products			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S. among other countries
	Metric 3:	Applicability	High	Data are for manufacturing and product formulation, in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (single value for concentration) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Tran, T. M., Hoang, A. Q., Le, S. T., Minh, T. B., Kannan, K. (2019). A review of contamination status, emission sources, and human exposure to volatile methyl siloxanes (VMSs) in indoor environments. Science of the Total Environment 691:584-594.			
HERO ID:	6836071			
Conditions of Use:	MFG			
EXTRACTION				
Parameter		Data		
Production, import, or use volume:		World production of VMSs reached over 8,000,000 to 10,000,000 tons per year in 2017 (pg 2)		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data/authors are from various countries, including the U.S., OECD countries such as Japan, and non-OECD countries such as China
	Metric 3:	Applicability	High	Data are for MFG, an in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent (i.e., data typically consolidated for multiple volatile methyl siloxanes, discrete D4 data not presented).
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	PV data
Overall Quality Determination			Medium	

Study Citation:	Tran, T. M., Hoang, A. Q., Le, S. T., Minh, T. B., Kannan, K. (2019). A review of contamination status, emission sources, and human exposure to volatile methyl siloxanes (VMSs) in indoor environments. Science of the Total Environment 691:584-594.
HERO ID:	6836071
Conditions of Use:	Cleaning and furnishing care products / automotive care products / paints and coatings / plastic and rubber products

EXTRACTION

Parameter	Data
Chemical concentration:	8280 ug/g total cyclics (D4-D6) in several industrial products and additives such as spot remover, fabric softening agents, machine lubricants, and car shell polishes and paints in China. VMSs were also detected in silicone-containing products that are mostly used for children (e.g., pacifiers, tethers, and toys), but at generally low levels; the average concentrations of 15 target methylsiloxanes ranged from 0.005 to 22.2 $\mu\text{g/g}$... Lykissa et al. (1997) investigated diffusion of components of VMSs in silicone breast implants and reported that low-molecular-weight (LMW) siloxanes accounted for about 1 to 2% to the total silicone gel mass with major contributions of D3 to D8. It should be noted that the breast implants examined in their study had been explanted after 2 to 5 years of implantation and the authors expected that the levels of VMSs in the original gels were significantly greater (pg 4)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data/authors are from various countries, including the U.S., OECD countries such as Japan, and non-OECD countries such as China
	Metric 3: Applicability	High	Data are for multiple in-scope occupation scenarios.
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent (i.e., data typically consolidated for multiple volatile methyl siloxanes, discrete D4 data not presented).
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by compiling concentration data for a variety of product types/COUs but uncertainty is not addressed.

Overall Quality Determination**Medium**

Study Citation:	Tran, T. M., Kannan, K. (2015). Occurrence of cyclic and linear siloxanes in indoor air from Albany, New York, USA, and its implications for inhalation exposure. Science of the Total Environment 511:138-144.			
HERO ID:	3014985			
Conditions of Use:	Use of products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Mean concentration of D4 in consumer products found at 9380 microgram/gram			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for use and formulation of consumer products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean value) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium		

Study Citation:	Tran, T. M., Le, H. T., Vu, N. D., Dang, Minh, G. H., Minh, T. B., Kannan, K. (2017). Cyclic and linear siloxanes in indoor air from several northern cities in Vietnam: Levels, spatial distribution and human exposure. Chemosphere 184:1117-1124.			
HERO ID:	3861464			
Conditions of Use:	Incorporation into a product			
EXTRACTION				
Parameter	Data			
Chemical concentration: Comments:	Concentration of D4 in shampoos and hair conditioners was 72.9 micrograms/gram; also found in wastewater treatment plant sludge cited from (Lu et al., 2011)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data that are from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Uninformative	Data are for use and formulation of cosmetics (shampoos and hair conditioners) , which is outside the scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Low	characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Uninformative		

Study Citation:	U.S. BLS, (2023). U.S. Census Bureau of Labor Statistics Data from 2021.			
HERO ID:	11138808			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Number of sites:	Used to develop a method to estimate number of sites.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	BLS is expected to use reliable survey methods.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	U.S. based economic data.	
	Metric 3: Applicability	High	These economic data cover all industry and occupation types in scope for all chemicals.	
	Metric 4: Temporal Representativeness	High	The BLS OES data are from 2021.	
	Metric 5: Sample Size	High	The BLS OES program provides detailed statistics and estimated relative standard error for each state, industry, and occupation survey conducted (https://www.bls.gov/oes/current/oes_research_estimates.htm).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	BLS documents results and methods, but underlying survey results not accessible.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Limited discussion of variability and uncertainty in results.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2020). 2020 CDR: Commercial and consumer use.			
HERO ID:	10366189			
Conditions of Use:	Manufacture and Import			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Provides U.S. domestic manufactured and imported PV and %PV to downstream uses.			
Number of sites:	Provides number of manufacturing and import sites.			
Chemical concentration:	Provides concentration.			
Physical form:	Provides physical form.			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	High	EPA is a trusted source.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	CDR is U.S. based data.
	Metric 3:	Applicability	High	CDR covers chemical manufacturers and importers, which are in scope for all chemicals.
	Metric 4:	Temporal Representativeness	High	Data is less than 10 years old.
	Metric 5:	Sample Size	Medium	Due to reporting threshold, statistical representativeness is unclear.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Submissions do not include method of how production volumes were determined. CDR industry sector codes, industrial processing and use codes, industrial function codes, and commercial product codes provide good metadata; but lack of clarifying information and narratives and occasional misreportings limit clarity of data.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	CDR data do not address variability or uncertainty in submitter provided data.
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (1995). AP-42: Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition.			
HERO ID:	46492			
Conditions of Use:	Intermediates in rubber product manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	The following is stated on pg. 1/20 of the document titled "AP42_cH4.12 Manufacture of Rubber Products Final_2008": "Many of the rubber manufacturing facilities in the United States produce pneumatic tires for automobile, trucks, airplanes and farm machinery. However, many rubber manufacturing facilities produce other engineered rubber products. The processes involved in these industries are very similar. Differences basically consist of the raw rubber material (natural or synthetic) used, the chemical additives, and the type of curing employed. The following is a description of a generic rubber manufacturing facility applicable to both tire and other manufactured rubber products, except where noted.The manufacturing of rubber products involves six principal processing steps (mixing, milling, extrusion, calendaring, curing, and grinding), with ancillary steps in between. Initially, the raw rubber (natural or synthetic) is mixed with several additives which are chosen based upon the desired properties of the final product. The mixed rubber is often milled and transferred to an extruder where it can be combined with other rubbers. Many rubber products contain synthetic fabric or fibers for strengthening purposes. These fibers are typically coated with mixed rubber using a calender. The extruded rubber and rubber coated materials are then assembled into a final shape and cured. Among the steps in the tire assembly process, described in more detail below, are bead building; cementing and marking; cutting and cooling; tire building; and green tire spraying. It is during the curing process that the rubber vulcanizes (crosslinks), producing the characteristic properties of finished rubber. Once the final product is cured, it is often ground to remove rough surfaces and/or to achieve symmetry."The data source contains additional detail about the various processing steps mentioned above after the text shown above.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Information that is part of EPA’s AP-42 program is deemed of high quality.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The information pertains to facilities in the U.S.
	Metric 3:	Applicability	Medium	The information pertains to a COU. The report is for an occupational scenario within the scope of the risk evaluation. not Specific to PAD/PA.
	Metric 4:	Temporal Representativeness	Medium	The information is 10 - 20 years old.
	Metric 5:	Sample Size	N/A	process description.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, andassumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	U.S. EPA, (1995). AP-42: Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition.		
HERO ID:	46492		
Conditions of Use:	Processing / Plasticizers in textiles, apparel, and leather manufacturing		
EXTRACTION			
Parameter	Data		
Process description:	Pg. 1/10: "Textile fabric printing is part of the textile finishing industry. In fabric printing, a decorative pattern or design is applied to constructed fabric by roller, flat screen, or rotary screen methods. In the roller printing process, print paste is applied to an engraved roller, and the fabric is guided between it and a central cylinder. The pressure of the roller and central cylinder forces the print paste into the fabric. Because of the high quality it can achieve, roller printing is the most appealing method for printing designer and fashion apparel fabrics. In flat screen printing, a screen on which print paste has been applied is lowered onto a section of fabric. A squeegee then moves across the screen, forcing the print paste through the screen and into the fabric. Flat screen machines are used mostly in printing terry towels. In rotary screen printing, tubular screens rotate at the same velocity as the fabric. Print paste distributed inside the tubular screen is forced into the fabric as it is pressed between the screen and a printing blanket (a continuous rubber belt). Rotary screen printing machines are used mostly but not exclusively for bottom weight apparel fabrics or fabric not for apparel use. Host knit fabric is printed by the rotary screen method, because it does not stress (pull or stretch) the fabric during the process." The data source contains additional information and process diagrams.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Information that is part of EPA's AP-42 program is deemed of high quality.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The information pertains to facilities in the U.S.
	Metric 3: Applicability	Medium	The information pertains to a COU. The report is for an occupational scenario within the scope of the risk evaluation. not Specific to PAD/PA.
	Metric 4: Temporal Representativeness	Medium	The information is 10 - 20 years old.
	Metric 5: Sample Size	N/A	process description.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium	

Study Citation:	U.S. EPA, (1995). AP-42: Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition.			
HERO ID:	46492			
Conditions of Use:	Processing /incorporation into an article/plasticizers in adhesive manufacturing.			
EXTRACTION				
Parameter	Data			
Process description:	Pg. 1/7 of "EPA AP42_Ch4.2.2.9 Pressure sensitive tapes and labels Final_1982.": The coating of pressure sensitive tapes and labels (PSTL) is an operation in which some backing material (paper, cloth, or film) is coated to create a tape or label product that sticks on contact. The term "pressure sensitive" indicates that the adhesive bond is formed on contact, without wetting, heating, or adding a curing agent.The products manufactured by the PSTL surface coating industry may have several different types of coatings applied to them. The 2 primary types of coatings are adhesives and releases.Release coatings are applied to the backside of tape or to the mounting paper of labels. The function of release coating is to allow smooth and easy unrolling of a tape or removal of a label from mounting paper.Five basic coating processes can be used to apply both adhesive and release coatings: solvent base coating, waterborne (emulsion) coating, 100 percent solids (hot melt) coating, calender coatingprepolymer coating. A solvent base coating process is used to produce 80 to 85 percent of all products in the PSTLindustry, and essentially all of the solvent emissions from the industry result from solvent base coating. Because of its broad application and significant emissions, solvent base coating of PSTLproducts is discussed in greater detail.The data source contains a additional process descriptions of the solvent based coating of PSTL.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Information that is part of EPA’s AP-42 program is deemed of high quality.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The information pertains to facilities in the U.S.	
	Metric 3: Applicability	Medium	The information pertains to a COU. The report is for an occupational scenario within the scope of the risk evaluation. not Specific to PAD/PA.	
	Metric 4: Temporal Representativeness	Medium	The information is 10 - 20 years old.	
	Metric 5: Sample Size	N/A	process description.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, andassumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.	
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.
HERO ID:	6311218
Conditions of Use:	Plastics Processing

EXTRACTION	
Parameter	Data
Production, import, or use volume:	Total Selected Thermoplastics (P. 3/18)Productionmillions of pounds, dry weight basis: 85,226millions of kg, dry weight basis: 38,728
Life cycle description:	custom compounding of purchased resins, comprises establishments primarily engaged in custom mixing and blending of plastic resins made elsewhere or reformulating plastic resins from recycled plastic products.
Process description:	Thermoplastic polymers are melted and become fluid when heat and pressure are applied. The molten polymers are formed into a shape via pressure. Thermoplastics solidify when cooled and the heating and cooling process can be repeated many times with little loss in properties. This generic scenario focuses on thermoplastic polymers.Thermosetting polymers (e.g., foam, epoxy) are formed into finishing products during a chemical reaction under pressure and heat. This process creates permanent cross-linking and the product retains it shape during subsequent cooling and heating. Thermosetting polymers are not within the scope of this generic scenario and are not discussed further.
Number of sites:	According to the 2001 Census Bureau County Business Patterns, there are 715 establishments.

		EVALUATION	
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods. Kirk-Othmer and AP-42.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States.
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination	High
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Study Citation:	U.S. EPA, (2016). Chemical Data Reporting (CDR): Complete 2016 submissions.		
HERO ID:	7315471		
Conditions of Use:	Commercial/Consumer Use		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Out of the 13 sites that reported to CDR, 1 site reported 0 lb of D4 used, 5 sites reported 120,332,593 lbs D4 used, and 7 sites claimed CBI/withheld.		
Number of sites:	In the 2016 CDR, 13 sites reported commercial or consumer use of D4.		
Chemical concentration:	Out of the 13 sites that reported to CDR for D4, 6 sites used concentrations of at least 1 but less than 30% by weight, 4 sites used at least 90% by weight, and 3 sites claimed CBI/withheld.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty is addressed but not variability.
Overall Quality Determination		High	

Study Citation:	U.S. EPA, (2016). Chemical Data Reporting (CDR): Complete 2016 submissions.			
HERO ID:	7315471			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Out of the 8 sites that reported to CDR, 1 site reported 0 lb of D4 used, 1 site reported 120,332,593 lbs D4 used, and 6 sites claimed CBI/withheld.			
Number of sites:	In the 2016 CDR, 8 sites reported the manufacture or import of D4.			
Chemical concentration:	Out of the 8 sites that reported to CDR for D4, 2 sites used concentrations of at least 1 but less than 30% by weight, 3 sites used at least 90% by weight, and 3 sites claimed CBI/withheld.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed by listing ranges for reported values. Variability isn’t addressed.
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2016). Chemical Data Reporting (CDR): Complete 2016 submissions.			
HERO ID:	7315471			
Conditions of Use:	Industrial Processing/Use			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Out of the 21 sites that reported to CDR, 1 site reported 0 lb of D4 used, 7 sites reported 120,332,593 lbs D4 used, and 13 sites claimed CBI/withheld.			
Number of sites:	In the 2016 CDR, 21 sites reported industrial processing and use of D4.			
Chemical concentration:	Out of the 21 sites that reported to CDR for D4, 8 sites used concentrations of at least 1 but less than 30% by weight, 9 sites used at least 90% by weight, and 4 sites claimed CBI/withheld.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed by listing ranges for reported values. Variability isn't addressed.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (1995). Chapter 6.4: Paint and varnish. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.
HERO ID:	7315881
Conditions of Use:	Processing / Incorporation into formulation, ..., reaction product/pain and coating manufacturing

EXTRACTION

Parameter	Data
Process description:	Pg. 1/2: "The manufacture of paint involves the dispersion of a colored oil or pigment in a vehicle, usually an oil or resin, followed by the addition of an organic solvent for viscosity adjustment. Onlythe physical processes of weighing, mixing, grinding, tinting, thinning, and packaging take place. No chemical reactions are involved. These processes take place in large mixing tanks at approximately room temperature.The manufacture of varnish also involves the mixing and blending of various ingredients to produce a wide range of products. However in this case, chemical reactions are initiated by heating.Varnish is cooked in either open or enclosed gas-fired kettles for periods of 4 to 16 hours at temperatures of 93 to 340°C (200 to 650°F)."

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources -AP-42
Domain 2: Representativeness	Metric 2: Geographic Scope	High	US data
	Metric 3: Applicability	High	Use in paints and coatings is a COU
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old. The information may be currently relevant.
	Metric 5: Sample Size	N/A	Process description.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	The sources of the information contained in the document are cited.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination

High

Study Citation:	U.S. EPA, (1995). AP-42: Chapter 11.2 - Asphalt roofing.		
HERO ID:	7315991		
Conditions of Use:	Asphalt paving, roofing, and coating materials manufacturing		
EXTRACTION			
Parameter	Data		
Process description:	”The production of asphalt roofing products consists of six major operations: (1) felt saturation, (2) coating, (3) mineral surfacing (top and bottom), (4) cooling and drying, (5) product finishing(seal-down strip application, cutting and trimming, and laminating of laminated shingles), and (6) packaging””Saturated felt (from the saturator) or base fiberglass (polyester) substrate enters the coater. Filled asphalt coating at 180 to 205°C (355 to 425°F) is released through a valve onto the top of themat just as it passes into the coater. Squeeze rollers in the coater apply filled coating to the backside and distribute it evenly to form a thick base coating to which surfacing materials will adhere. ”		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources (AP-42) and are generally accepted by the scientific community, and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old. The report captures operations, equipment, and worker activities that are expected to be outdated.
	Metric 5: Sample Size	N/A	Data not based on sampling
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed between different processes, uncertainty is not addressed
Overall Quality Determination		High	

Study Citation:	United Laboratories, (2019). Safety data sheet: United 101 moisture barrier and electrical lubricant.			
HERO ID:	7311189			
Conditions of Use:	Solvent/degreaser			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1-5%			
Comments:	Relative Density: 0.8 - 0.9			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation. (Potting agents and aircraft maintenance)
	Metric 4:	Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Ward, D. B., Tizaoui, C., Slater, M. J. (2003). Ozone-loaded solvents for use in water treatment. Ozone: Science and Engineering 25(6):485-495.			
HERO ID:	6835983			
Conditions of Use:	Lab Use (as a solvent)			
EXTRACTION				
Parameter	Data			
Process description:	Using D4 as a solvent in a lab, a solvent for ozone, to treat water polluted with organic chemicals via oxidation from the ozone			
Chemical concentration:	Volasil 244 contains 96% octamethylcyclotetrasiloxane (Volasil is just a commercial name for D4, pg. 4/12)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the United Kingdom, an OECD country.
	Metric 3:	Applicability	High	Data are for laboratory chemicals, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium		

Study Citation:	Xu, L., Huang, Z., Zhang, Q., Xiang, X., Zhang, S., Cai, Y. (2020). Methylsiloxanes and their brominated products in one e-waste recycling area in china: emission, environmental distribution, and elimination. Environmental Science & Technology 54(7):4267-4274.
HERO ID:	6836349
Conditions of Use:	disposal (e-waste)

EXTRACTION	
Parameter	Data
Production, import, or use volume:	China: 61,000 tonnes of PDMS products sold in global electronics market in 2013; Chinese electronic industry consumed 520,000 tonnes of PDMS in 2018
Life cycle description:	cVMS's (D4, D5, and D6) are polymerized into polydimethylsiloxanes (PDMS) are often used as sealants, insulating agents, and protective coatings for printed wiring boards (PWBs), electronic chips, semiconductors, and control units.
Chemical concentration:	1.7-13.2 ug/g concentration of D4 in printed wiring board samples (total 20 samples) pg. 4/8
Comments:	There appears to be a supplemental file for this, see link in Section 3, pg. 4/8,

		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	High	Data are for disposal of D4-containing products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.

Overall Quality Determination	Medium
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Study Citation:	Xu, L., Shi, Y., Liu, N., Cai, Y. (2014). Methyl siloxanes in environmental matrices and human plasma/fat from both general industries and residential areas in China. Science of the Total Environment 505C:454-463.
HERO ID:	2533248
Conditions of Use:	Manufacturing and Commercial Use of products

EXTRACTION	
Parameter	Data
Production, import, or use volume:	Total annual production volume of cyclic methyl siloxanes (includes D4 and others) was 470 million kg based on 2002 EPA report; 800 million kg in China based on 2009 report
Chemical concentration:	Range of total cyclic methyl siloxane concentrations in several products along with percent of detection frequency, including home paint (1.2 to 336 microgram/gram); car shell paint and polish (712 to 1596 microgram/gram); machine lubricant (1013 to 1323 microgram/gram); spot remover and fabric softener (1995 to 8280 microgram/gram)

EVALUATION		Rating	Comments
Domain	Metric		
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3: Applicability	High	Data are for commercial use of various products, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution for chemical concentrations characterized by limited statistics (range and detection frequency) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.

Overall Quality Determination**Medium**

Study Citation:	Xu, L., Shi, Y., Wang, T., Dong, Z., Su, W., Cai, Y. (2012). Methyl siloxanes in environmental matrices around a siloxane production facility, and their distribution and elimination in plasma of exposed population. Environmental Science & Technology 46(21):11718-11726.			
HERO ID:	2558926			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	catalytic acid cracking of raw materials, including raw silicone rubber, to methyl siloxanes and then rectifying to monomers			
Throughput:	siloxane production facility in China has annual yield of about 10,000 tonnes			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	High	Data are for manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	N/A	This metric is not applicable to the data being extracted
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium		

Study Citation:	Xu, L., Zhi, L., Cai, Y. (2017). Methylsiloxanes in children silicone-containing products from China: Profiles, leaching, and children exposure. Environ-ment International 101:165-172.			
HERO ID:	3603436			
Conditions of Use:	Incorporation into a product			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Concentration of D4 in a variety of silicone-containing children/baby products including hard toys, pacifiers, teethers, and soft rubber toys; average of all products was 0.653 microgram/gram with SD of 4.61 microgram/gram; also provided minimum and maximum, detection frequency, and median; also gives breakdown for each class of products (e.g. pacifiers)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data are from China, a non-OECD country.
	Metric 3:	Applicability	Low	Data are for concentrations in children’s product. Possibly of some use for an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (min, max, mean, median, detec-tion frequency) but discrete samples not provided and distribution not fully character-ized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by testing a large number of products from each product category, but uncertainty is not addressed.
Overall Quality Determination		Medium		